VOLUME 1 - NO. 9 DECEMBER 1993

Turn On Your Radio

Let's review just a few recent low band highlights.

- N2KK's 80 meter contact with 9N8HP in Nepal puts Dave at the 330 country level alltime on 80 meters.
- SM4CAN and N6DX hook up on 160 meters for Kent's first W6 contact on top band.
- A71CW is showing up on 75 meter phone almost nightly working stateside stations.
- 80 meter long path regulars HZ1AB and A45ZZ have returned on most mornings with good signals.
- W8UVZ worked 34 zones (just missed #35) and 105 countries from Michigan on 80 meters in the 1993 CQWWCW Test.
- KV0Q worked 21 zones and 46 countries from Colorado on 160 meters in this event.

These are just a few of the opportunities that have presented themselves since our last issue. I hope you were able to take advantage of some of them.

Low Band Awards Program

The certificates and prizes are ready and some real achievers have already stepped forward to claim their awards. Seven subscribers have qualified for our 160 meter Worked All Continents Award.

We would also like to have you take the time to send us a list of your contacts, should you make a WAC on 160 meters. No QSL's are required, just your log information.

Our 40 meter (150 countries) and 80 meter (100 countries) awards are more challenging and also only require a copy of your log information to receive.

Additional details regarding these awards are included in this issue.

Boulder "A" Index Study

Have you ever used the Boulder 24 Hour "A" Index to predict Low Band Propagation trends? This is the index that is recorded at 0000Z each day by the National Oceanic and Atmospheric Administration in Boulder, Colorado.

The "A" index is actually a composite of eight of the 3-hour "K" indices. Both the "A" and "K" indices are broadcast at the 17 minute past the hour times on WWV in Fort Collins, along with the solar flux; but the "A" index is only computed once per day (0000Z), while the "K" index is derived every three hours.

A number of low band DXers use this index and it's changes to predict propagation conditions on the lower frequency bands. We will attempt to verify the accuracy of various prediction methods using this index by having our readers identify their best propagation days of 1993. This will be interesting!

Thanks to Ed Erwin at the N.O.A.A. National Geophysical Data Center in Boulder, Colorado we have all of the "A" indices for 1993 to review in this issue.

We ask our readers to review their low band logs for 1993 and help us identify various correlations between changes in this index and low band openings.

This data, some guidelines for the study and some sample observations are included in this issue.

Lance Johnson - Editor

Low Band DX News

• Battle Creek Aruba Activity In CQWW 160 Test

The Battle Creek Top Banders plus one will be going to Aruba for the CQWW 160 CW Contest, January 28 - 30 of 1994. Operators will be W0CD, W8SEY, W8UVZ and K8GG. This is the crew that activated J37XT in 1990. They will be armed with a Battle Creek Special Antenna and Beverages for 160 meters. From Aruba, the contest call sign, P40U has been reserved, but the calls P40GG and P40CD may also be used before and after (Jan 25 - Feb 2) the contest on 160 - 10 meters, including the WARC bands. Contest QSL's to K8GG or W8UVZ. QSL via operators CBA.

BATTLE CREEK TOP BANDERS

• Zone 34 Active On Low Bands

Mohamed, SU2MT has recently been active on both the 40 and 80 meter bands around 1400Z, working U.S. stations in the Midwest and west coast long path. QSL to: Mohamed Tartousieh, Box 1616, Alexandria, Egypt. An impressive signal on both bands.

TNX: DOC - KD7SO

• 160 Season's First Superior Opening To Europe

The Midwest and Western U.S. enjoyed it's first major European 160 meter opening on December 3, 1993. For two full hours stations like G3PQA, OZ1GML, PA0HIP and 4X4NJ were audible as far west as California.

LOW BAND MONITOR

• NEC/Wires 1.0 Software

Brian Beezley, K6STI, has recently released a new antenna software that should be of interest to the low band DXer called *NEC/Wires 1.0.* This implementation of the powerful and sophisticated Numerical Electromagnetics Code is the first ever offered to amateurs for modeling general antennas of wire or tubing. *NEC/Wires 1.0* has a modeling capacity several times greater than *MININEC* based programs and runs faster. This is the only software that can accurately predict the performance of antennas close (within 0.2 wavelengths) of ground. The Amateur version sells for $100.00. Contact Brian Beezley, K6STI at 507-1/2 Taylor, CA 92084 (619) 945-9824.

LOW BAND MONITOR

• Early CQWWCW Multi-Multi Top Band Rumors

Multi-Multi Station low band highlights in this years CQWWCW test include: K1AR with 24 zones and 82 countries on 160 meters, N2RM with 20 zones and 76 countries on 160 meters. California station N6DX managed a very impressive 26 zones and 37 countries on the 160M band.

TNX: BILL - AA6TT VIA INTERNET

• Eritrea Reminder

January 1, 1994 will be Eritrea Day for many DXCC holders, as it is a "new one" for just about everyone. Don't forget to submit this QSL in your next endorsement as it is obviously not listed on your country list.

THE ARRL LETTER

• N6SS To VQ9QM

Preston, N6SS will be active on 160 meters for 3 months beginning December 30, from VQ9QM. Listen during your sunrise around 1.827 mhz.

TNX: CHARLIE - KY0A

• Bosnia - 4O4D QSL Strategy

Station 4O4D can be QSLed by: "Goky-Dado, Box 99, 74000 Doboj RS, VIA: Yugoslavia". This station has been active on 40 - 80 - 160 meter bands.

TNX: CHARLIE - KY0A

Real World Beverages

The Editor Makes A Modest Effort and is Still Confused - by KØCS

Editor's Note: Beverage antenna systems have been discussed in the Low Band Monitor a number of times in previous issues. This is a discussion of a real world Beverage system installed on a small 5 acre lot in Colorado. The system is installed in two steps. The first portion discusses the basic layout of "simple" Beverages. The second section includes terminations, matching, grounding and tuning.

• **Phase One** - During the past few years I have visited over a dozen successful top band stations that have achieved 160 meter totals, in some cases in excess of 200 countries. All of these stations use Beverage antennas for receiving on the 160 meter band.

Most of us know that the transmit phase of the typical 160 meter DX contact can easily be accomplished. Just forego your kids college education, put up a 130 foot vertical with lots of radials, buy an Alpha 77 two tuber (if you can find one) and let it rip - it's how we Americans do things - brute force! More correctly, how Americans used to do things!

Hearing weak signals on the 160 meter band is a different story. It requires finesse. It requires experimentation. It requires patience. None of the existing texts or journals have really addressed 160 meter receiving antennas completely. There really is no simplistic approach that works all the time.

When you find yourself entering the world of Beverage antennas you are going to immediately find out why many of the people that own them don't talk a lot about them.

There are two reasons for that. 1. Information gained from Beverage antennas has been earned with a lot of hard work and frustration; 2. They do not always perform as predicted in the existing texts.

Lets look at some of my observations with a recently installed Beverage system.

• **Some Advantages You Need To Consider** - Your main objective when considering a Beverage antenna system is to of course improve your ability to copy signals on the 80 and 160 meter bands. There are also some additional benefits.

1. Beverage antennas are typically constructed at a safe working level. These antennas do not require the usual tower climbing precautions of transmit antennas and because of their length will provide the experimenter with a nice aerobic workout.

2. Beverage antennas do not require high quality feed lines. Low cost RG-8X or RG-58 coax is suitable for just about every application.

3. Beverage wire (#17 fence wire) is also inexpensive and can be purchased in 1/4 mile lengths for under $10.00 a roll in most markets. Supports and insulators are also inexpensive.

4. The system can be removed during the summer months if necessary because permanent supports are not needed.

5. Impedance matching and antenna switching can be achieved with either home brew or commercially made accessories.

The key to your success with a Beverage system is to develop a plan and then implement it in a manner that allows for some flexibility.

• **Preparing Your Property** - My lot is definitely "real world", a modest 5 acres with electrical service lines bordering my property on the northern side. My first concern was directed at the cutting of the High Plains grass to ground level, with frequent trimming of any plants that would protrude through the snow that might attract a stray horse, an antelope or deer.

Overkill you say! Last year a stray horse was attracted to some shrubs that protruded up through the snow and after completing the snack, ran off with my Northeast Beverage, and sheared a chassis mount VHF connector in half on my switch box.

Cutting your grass down to a short level will also make the installation of the system go much easier and perhaps impress your neighbors enough that you won't be reported to the zoning commission..

• **Location of the Switching Hub** - The use of a commercially made remote coax switch (Ameritron RCS-8V) will allow you to select more than one Beverage antenna.

Your choice should be based on the amount of relative isolation from towers, fences, buildings and other structures first, and then the headings of each individual Beverage.

In my situation, I located this hub along the south edge of my property and fanned the Beverages to the west, northwest, north, northeast and east directions.

This approach will require me to install two additional hubs at a later date to address more southern paths, like Peter I and WØZV's recommended 220 degree heading for long path.

An optimum hub material would be a small telephone pole or 6" x 6" wooden post. A metal pole could be used, but it has greater potential for noise pickup and could possibly even generate noise.

Regretfully, I was forced to use a galvanized metal pipe for my hub installation and have wiped liberal amounts of petroleum jelly on all metal-to-metal surfaces to reduce the potential for noise generation.

Obviously one could put the hub in the center of his property for more efficient (360°) use of the hub, but in my case towers, delta loops and power lines forced me to use this scheme.

Remember: Locate the hub in the most isolated part of your property. Keep it away from as many man made structures as possible. Use a non metallic material if you can.

• **Control Cable and Feed Line Considerations** - When laying out your feed line and control cable it is a good practice to allow for different routes for each cable run, a "high road" and "low road" if you will. It is also advisable to not run your control or feed line parallel to any of your Beverages.

You can test for any coupling effects from your cables by connecting a transistorized shortwave receiver (Sony Pro-80) to your hub and then listening for noise pickup as you move your cable orientation.

Charles Summers, KYØA also recommends listening to your feed line on your transceiver with no Beverages attached, to check for any coupling effects on your (empty) feed line.

Your safest approach is to keep the cables away from the Beverages as much as possible and spacing the control and coax lines at least 10' feet apart, until they get back to your operating position.

• **The Beverage Wires** - Once the hub is installed and the switch box attached, it's time to install the actual Beverage runs. I connect about 18" of wire to an insulator and attach it to the hub for each Beverage. Attach the wire from the spool to each insulator and start walking. In the real world it's not quite that simple.

We must first address your support requirements. I will tell you right now that a Beverage will work just fine if elevated to the 10 foot level. I like this level for a number of reasons. First, a 10 foot long PVC pipe (1-1/2" diameter) costs $5.99 locally, and secondly, we have no Giraffes running loose on the High Plains of Colorado or you would need a 20 foot elevation.

A novel approach for supporting your PVC pipe is to use standard 4 to 5 foot long steel fence posts, these will cost around $2.49 at your local building supply.

Drive your fence posts into the ground and then set the PVC pipe over the post. You can also use the standard PVC "T" fittings at the top to allow easy passage for your Beverage wire. Just remember to put the "T" fittings on the Beverage wire first, and then connect the Beverage to the insulator at the hub.

You are probably offended that I had to mention something so trivial, but if you forget smallish details like this you will wind up walking an additional mile or so to correct the problem. Think of all the systemic effects this extra aerobic workout will have on your body. Beverages are kind of like cross country skiing when you forget minor details.

Figure about 200-250 feet of wire between each support, so on a 500 foot Beverage you would only need one PVC support, one fence post and one "T" fitting.

Let's not worry about length details at this point. Run each Beverage to your property boundary, connect the end to an insulator and using some strong nylon rope, tie it off to the appropriate stationary object (fence, tree, wall, etc.) or simply utilize another fence post.

- **Connecting your Beverages To the Switch Box** - After you have run your Beverage lines. You will find that connecting them to the switch box is trivial, as the Ameritron RCS-8V uses PL-259 connectors, I used #12 copper wire for this purpose and found that I was able to solder this directly to the Beverage wires without the use of any special solder flux. When you buy your fence wire, insist on good fresh stock. Some of the fence wire I have seen has been setting on the shelf so long that it has oxidized to the point that the wire will have to be dressed with emery cloth in the field. A cold solder joint on any of your Beverages can be devastating, as it may act as a rectifier in the presence of a strong commercial AM broadcast signal and create havoc on the 160 meter band. If soldering in the field is a problem, simply use a mechanical technique. A bolt, a nut and two washers will do fine.

- **Simple Beverages** - You have probably done enough work for the day. You have installed your hub, your feed line, your control line, your five Beverages and connected them to your switch box. Stop, take a break and evaluate where you are.

You now have what has been termed as "simple" Beverages. These are Beverages that have no terminations and are therefore bi-directional. You also have made no attempt to match them to your 50 ohm feed line. Remember, they are of random length at this point and have not been tuned to a particular band or band segment. Finally, you have not decided what to do with the four Beverages that are not being used - that is, do you ground them or let them float as an open element and risk having them couple to the Beverage in use.

Spend the evening listening to these "simple" Beverages as much as possible. You will notice that they really are "quiet" and you should see some front-to-side effects on some signals.

This is an important phase. You should be able to wring out any dumb mistakes, like miswiring your control box, shorting your feed line or correcting a cold solder joint where the Beverage connects to the switch box. More importantly, you have an opportunity to gain a point of reference for the important second phase, that will address the enhancements to the system.

I strongly recommend that you approach this project in at least two stages, so that you minimize the tricky variables that are sure to be encountered in the latter stages of the project.

- **Your Transceiver** - Before we move to Phase Two, lets look at your transceiver. Hopefully your transceiver has a jack that permits the transceiver to use a "receiving antenna". By connecting your Beverage system to this jack you will mute the transmit antenna on receive, and rely solely on the Beverage system.

Your transmit antenna will only be used in the transmit mode and this scheme will eliminate the possibility of you accidently transmitting into one of the Beverage antennas.

Don't depend on manually switching from your transmit antenna to your Beverage antenna by using a coax switch, you will be sorry.

This exercise is usually quite simple on most modern equipment. Just refer to your owners manual, and pray that you saved your transceiver's accessory plug

- **Phase Two** - After a few days of evaluating your "simple" Beverage system, it's time to make a few enhancements.

A. Should you ground the unused Beverages? Most people say yes. The Ameritron RCS-8V allows you to ground any or all of the unused Beverages by soldering a small piece of wire at the base of each relay.

John, WØUN advises that, " It may be best to open the Beverage that is not being used instead of shorting them to ground. Current is what radiates and shorting them forces that point to be a current point. On the other hand capacitive coupling might be the mechanism and a high impedance point would couple capacitively much better."

John and others have debated this topic for years. I grounded mine. Stay tuned for future recommendations.

B. Should Beverages be cut to exact wavelength multiples or random lengths? If operation on both the 80 and 160 meter bands is desired, the tuned length approach would optimize one length at the expense of the other. My Beverages lengths are defined by my property boundaries, but tuned lengths will be tried later.

C. Should the termination resistors be located at the true end of the Beverage or should they be located a quarter wavelength in from the Beverage end? Again we are faced with the tuned approach on one band possibly degrading performance on another. My Beverages terminating resistors were located at the true end.

D. What type of ground method was used at the terminations? Six foot ground rods were used at the terminating point of each Beverage. Remember, on a tuned termination you do not need to ground the end of the wire, but you must make some provision for relieving the tension from the Beverage wires at the terminating resistor.

E. What type of impedance matching system is used? The Amidon toroidal transformer (FT-114-61) discussed in an earlier *Low Band Monitor* (June 1993) was used. If a terminating resistor of 450 ohms is used, you can assume that a 9 : 1 transformer will match your 50 ohm feed line. This equates to a 45 : 15 turns ratio on your toroid. The Amidon toroid can easily be mounted inside a Radio Shack project box using two chassis mount VHF connectors to mate with your switch box and feed line. The Amidon Tech sheet explains the use of toroids in detail and is available from Amidon Associates, P.O. Box 956, Torrance, CA 90508.

F. Is matching really that simple? No, the method discussed above assumes normal to above normal ground conductivity. If you have lossy ground you will find that a smaller value of terminating resistor is needed. Using a transistorized receiver at your hub, you and one of your friends can insert a variable resistor (0 to 1K) at the termination and tune for a null on a signal source on the back of the Beverage as the potentiometer is varied. My terminations are designed for quick changes using discrete values of resistance. The process can be tedious, but think about the exercise you get walking 2000 to 3000 feet to change a few resistors.

John, W0UN advises that G3SZA used a potentiometer to evaluate the Beverages at K0RF and found the proper termination resistance on some of the Beverages to be less than 100 ohms, due to the very lossy soil at Chuck's QTH.

G. Can't you just transmit into the Beverage to find out the impedance? Some people recommend transmitting into the Beverage with a few watts of RF and using a simple SWR bridge to find the proper terminating resistance. This is acceptable if you have access to properly rated, non-inductive resistors, a Jeeves type helper available 24 hours a day and two handheld transceivers.

I have used this method and frankly found it to be cumbersome. I prefer to listen to the system and find the passive approach to be safer than having a transceiver turned on an off a few dozen times for each Beverage.

If you have ever had your golf game messed up by an RF burn you will understand what I mean.

- **Evaluation** - Now that terminations and matching have been added to the system you should look for better performance. Since my system has only two parallel (west vs. east) elements at this point, these two Beverages provide me with the best barometer for measuring front-to-back performance. When you try out your system, have at least one pair that are 180° opposed so that you can evaluate changes you make to improve the front-to-back performance.

One aspect of Beverages that is annoying is that because they have negative gain when compared to your transmit antenna, most DX signals will not move your S-meter. You will find that although one antenna sounds better than another for a particular signal, you have no way to quantify one antenna against the other unless you add a preamplifier.

This has some interesting implications on signal reports as you will find yourself redefining your own previous signal evaluation methods.

One aspect of Beverages that I want to emphasize is that they have an almost uncanny ability, when working properly, to capture truly weak signals, that will routinely be missed with casual tuning. If you increase the audio of your transceiver to it's fullest on a quiet band and tune carefully, they will often surprise you.

- **Actual Performance** - One foot of snow can really hurt ones enthusiasm for a project of this kind. Lets first describe my five Beverages and their orientations.

1. *West 270° - 540 Feet* - This Beverage parallels a barb wire fence 20 feet away and terminates near a propane tank. Definitely a compromise, but I have been pleased with it's operation. Best DX on 160 meters has been a V7. Noticeable front-to-back has been observed on beacons like KH6CC and FK8CP when compared to the Eastern (90°) Beverage.

2. *Northwest 300° - 400 Feet* - This Beverage initially was installed as a joke. Remember this is actually less than one wavelength on 160 meters. It actually is routed to within four feet of one of my towers. It does however marginally enhance JA and KL7 signals on 160 meters. The surprise is that on ZL and VK 160 meter signals this Beverage is superior to the 270° antenna. That's broadside to their signals!

3. *North 30° - 250 Feet* - This was another joke that has generated a few surprises. This "quasi" Beverage sometimes enhances 160 meter signals from the Caribbean and it has nelped me hear some JA stations. When listening to a rare European short path 1400Z sunrise opening one morning on 75 meters, it was the Beverage of choice.

4. *Northeast 60° - 540 Feet* - This Beverage is in a nice open environment and seems to perform as expected. Europe has been worked a few times and I guess 4X4NJ would be the best DX. This antenna can also enhance Caribbean signals that are arriving at a high angle broadside to the Beverage. HH2PK was so loud at my sunset on this antenna in the CQWW that I thought he was a local.

5. *East 90° - 540 Feet* - This Beverage also benefits from an open environment, although I wonder about it's paralleling a barb wire fence 20 feet away. 6W6JX has been the best 160 meter contact so far. It sometimes hears Europe better than the 60° Beverage.

- **Conclusion** - Bad weather has curtailed additional follow-up and experimentation with these antennas, but I feel that I have made some modest progress.

Even in a compromise situation like this one with propane tanks, power lines, towers, barb wire fences and sub optimum lengths, these antennas provide a significant receiving advantages over ones transmit antenna.

The ability of these antennas to hear some signals quite well broadside to their intended direction was a surprise. This observation has been made during sunrise, sunset and in the middle of the night, but seems to be best during my sunrise.

When the other hubs (southern orientation) are installed at a later date we will be in a better position to comment on overall performance.

Like many things in life, I find that I understand things like Beverage antennas less, the more experience I have with them.

I understand now why those people that use Beverage antenna systems don't really like to expound on their details.

My country total is going up, but I'm more confused about Beverages now than when I started.

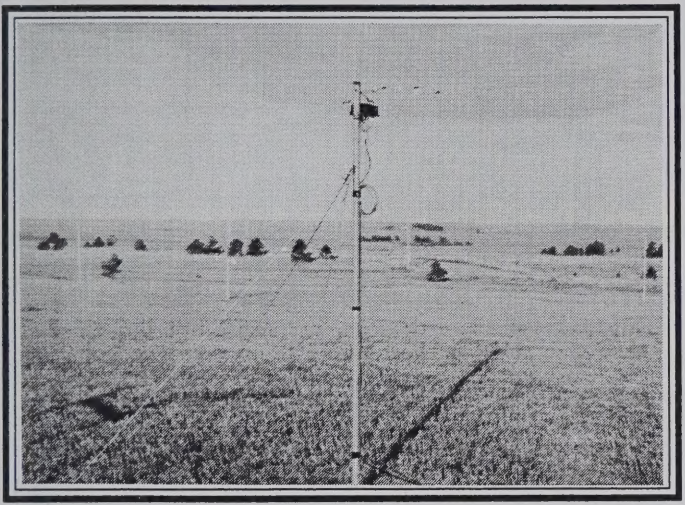
SPOT OF THE MONTH CLUB WINNERS FOR DECEMBER

WIN AN EXTRA MONTH'S SUBSCRIPTION!

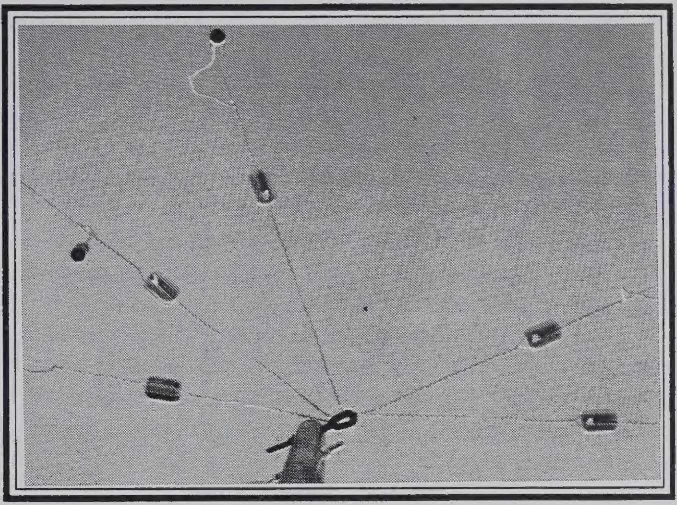
AA6TT
SU2MT - 7.001 - 1525Z - 11 DEC
WA0PUJ + N2KK
9N1HP - 3.787 - 1334Z - 1 DEC
N6DX
SM4CAN - 1.832 - 0700Z - 28 NOV

SEND YOUR POWER SPOTS TO:
Low Band Monitor
P.O. Box 1047
Elizabeth, CO 80107
(303) 646-4630

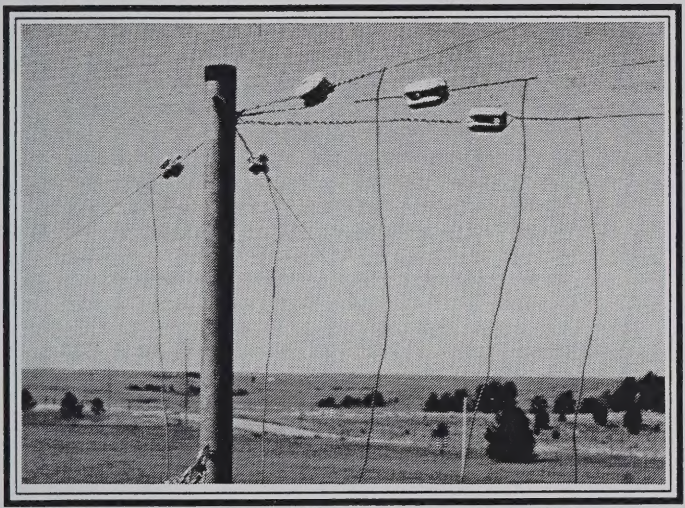
Real World Beverage Details



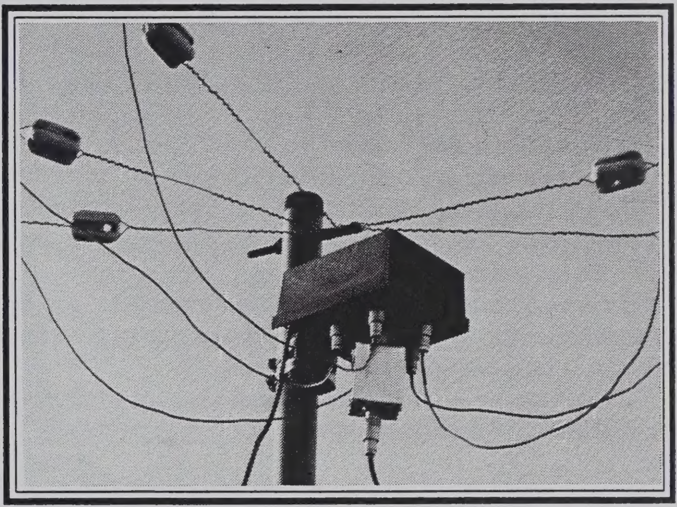
This type of metal hub is not optimum. A non-metal material would be a better choice. Notice the well cut grass.



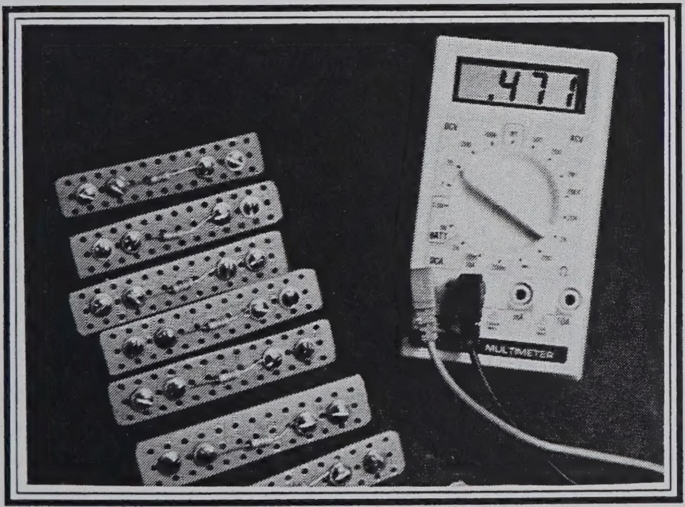
Northern Exposure from left, 90°, 60°, 30°, 300° and 270°. A hub with a Southern Exposure will be added later.



Beverage preparation using standard PL-259 connectors for connection to switch box. Soldered with torch in the field.



Switch box installed with matching transformer (9 : 1) attached below. Feedline is RG-8X. Heighth is 10 ft.



Terminating resistors are nominal 470 ohm. These brackets can be used to relieve strain if tuned approach is used.

Example of an untuned termination. Rope tensions the wire. The wire terminates to a 6 ft. ground rod.

Boulder "A" Index Daily Variations

Can the 24 Hour Index Predict Low Band Openings? - by K0CS

Editor's Note: The Low Band Monitor needs your help. Review your logs for 1993 and help us analyze those special days where signals on the lower frequency bands were truly outstanding. We will then compile the data and test various theories using changes in the Boulder "A" Index as a predictor.

Background - Most accomplished low band operators know that there is no substitute for consistent monitoring of the bands on a daily basis if you want to achieve a high country total.

Unfortunately, the demands of day to day living today have taken away ones ability to be consistent in our operating habits. Many low band DXer's are lucky to be able to check the bands more than a few times a week, due to the pressures of family, careers and other interests.

Under these demanding conditions, the experienced DXer will attempt to work smarter, and try to pick operating periods that have a higher probability of success so that his precious operating time is maximized.

WWV Solar Terrestrial Broadcasts - Radio station WWV in Fort Collins, Colorado broadcasts the Solar Terrestrial indices of Solar Flux, Boulder "A" Index and the Boulder "K" Index at 18 minutes past each hour on 2.5, 5.0, 10.0, 15.0, and 20.0 Mhz.

The same data is also broadcast from WWVH in Hawaii at 45 minutes past the hour at 2.5, 5.0, 10.0, 15.0 Mhz.

The low band enthusiast can also call the Space Environment Services Center in Boulder, Colorado at (303) 497-3235 and receive the latest indices.

These broadcasts also include a 24 hour forecast and report any significant activity like solar flares, proton events, geomagnetic storms and stratospheric warming events.

K Index Basics - The Boulder "K" Index is a quasi-logarithmic local index of geomagnetic activity that is calculated every 3 hours.

A magnetometer located on Table Mountain in Boulder continuously records the three readings that make up this index; Horizontal Intensity(H), Vertical Intensity(Z) and Declination(D).

Horizontal intensity and Vertical intensity are measured in micro Tesla's (μT) which are units of magnetic flux density. One Tesla is equal to one Weber per square meter. Declination is measured in degrees. This refers to the difference seen in a compass between magnetic north and true north.

For 1987, a very active solar year of Sunspot Cycle 22, the mean value for H was 19 μT. The mean value for Z was 44 μT. The mean value for D was 6.6° west.

The "K" index is a measurement of variation of these three measurements over the 3 hour time period.

During a quiet sun period you will have little variation in H, Z and D. This would produce a low "K" index, with 0 representing the lowest variation level. Obviously a large variation would produce a high "K" index, with a 9 representing the largest variation.

Experienced Dxer's know that a high "K" index is not desirable, as high geomagnetic activity disrupts the ionized layers that make lower frequency propagation over long distances possible.

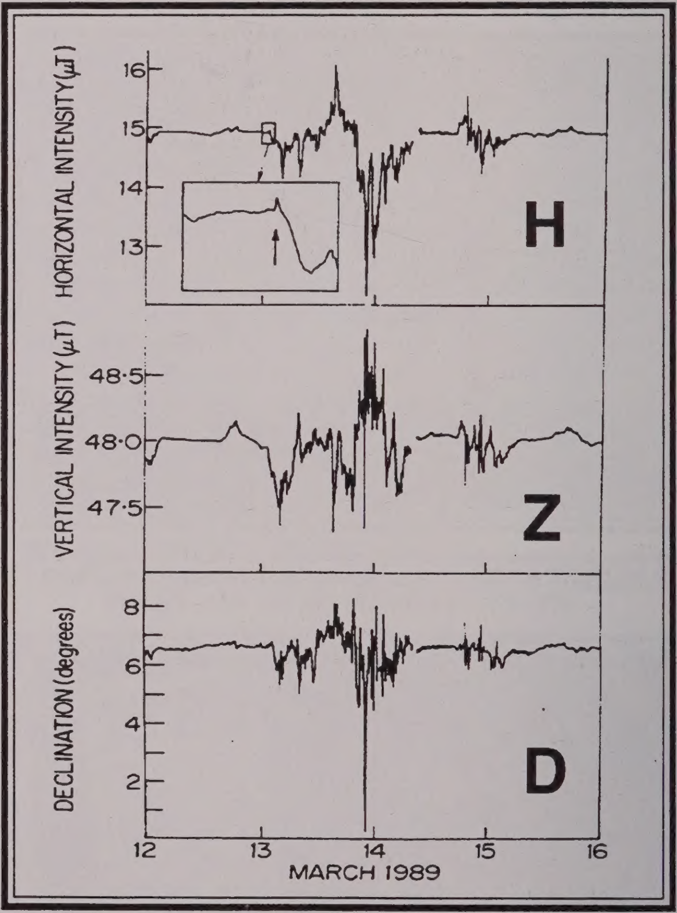
A Index Basics - The Boulder "A" Index is an average derived from the 8 "K" (3 hour) indices that were recorded during the previous 24 hour period. It takes 8 "K" indices to make one "A" Index.

The "A" Index is changed at 0000 UTC each day and will not change on WWV until 0000 UTC on the following day.

The "A" Index is scaled differently than the "K" Index and can in extremely rare cases exceed a level of 100.

It is important to mention that geomagnetic activity is also measured at over a dozen other locations around the world that possess apparatus similar to that in Boulder, Colorado. Scientists from all over the world combine these indices to derive planetary "K" and "A" indices that are used for long range types of research uses.

Because the Boulder indices are accessible to us all, we can use this data to predict various HF propagation opportunities.



HORIZONTAL INTENSITY (H), VERTICAL INTENSITY (Z), AND DECLINATION(D) OBSERVED DURING A GREAT MAGNETIC STORM AT THE LERWICK ENGLAND OBSERVATORY

Low Band Propagation - As we all know, HF propagation in general is best when WWV reports a low "K" and "A" index. Low band propagation on the 40, 80 and 160 meter bands is also best when the indices are low, but there are some interesting observations that enthusiasts have made regarding abrupt changes in these indices.

LOW BAND MONITOR

Power Spots By: __________

FREQ	CALL	TIME	DATE	COMMENT

REMARKS:

LANCE JOHNSON
DIGITAL GRAPHICS
P.O. BOX 1047
ELIZABETH, CO 80107

24 HOUR BOULDER"A" INDEX STUDY 1993 (Courtesy: Ed Erwin - N.O.A.A.)

DATE	A	DATE	A	DATE	A	DATE	A	DATE	A	DATE	A
JAN 1	8	MAR 1	12	MAY 1	6	JUL 1	18	SEP 1	0	NOV 1	7
JAN 2	12	MAR 2	15	MAY 2	5	JUL 2	23	SEP 2	3	NOV 2	3
JAN 3	24	MAR 3	19	MAY 3	10	JUL 3	15	SEP 3	30	NOV 3	8
JAN 4	18	MAR 4	20	MAY 4	5	JUL 4	8	SEP 4	23	NOV 4	40
JAN 5	14	MAR 5	5	MAY 5	6	JUL 5	2	SEP 5	12	NOV 5	20
JAN 6	11	MAR 6	8	MAY 6	10	JUL 6	5	SEP 6	10	NOV 6	21
JAN 7	17	MAR 7	11	MAY 7	14	JUL 7	10	SEP 7	10	NOV 7	18
JAN 8	7	MAR 8	19	MAY 8	37	JUL 8	14	SEP 8	6	NOV 8	14
JAN 9	13	MAR 9	51	MAY 9	28	JUL 9	11	SEP 9	3	NOV 9	8
JAN 10	24	MAR 10	9	MAY 10	46	JUL 10	10	SEP 10	4	NOV 10	9
JAN 11	15	MAR 11	29	MAY 11	3	JUL 11	22	SEP 11	5	NOV 11	4
JAN 12	6	MAR 12	20	MAY 12	13	JUL 12	9	SEP 12	9	NOV 12	4
JAN 13	8	MAR 13	23	MAY 13	4	JUL 13	8	SEP 13	43	NOV 13	7
JAN 14	15	MAR 14	16	MAY 14	15	JUL 14	0	SEP 14	23	NOV 14	9
JAN 15	12	MAR 15	39	MAY 15	8	JUL 15	3	SEP 15	18	NOV 15	8
JAN 16	5	MAR 16	23	MAY 16	13	JUL 16	1	SEP 16	5	NOV 16	7
JAN 17	13	MAR 17	17	MAY 17	16	JUL 17	1	SEP 17	3	NOV 17	5
JAN 18	6	MAR 18	14	MAY 18	4	JUL 18	3	SEP 18	3	NOV 18	16
JAN 19	15	MAR 19	9	MAY 19	10	JUL 19	2	SEP 19	2	NOV 19	20
JAN 20	9	MAR 20	14	MAY 20	11	JUL 20	12	SEP 20	14	NOV 20	7
JAN 21	4	MAR 21	19	MAY 21	2	JUL 21	13	SEP 21	7	NOV 21	4
JAN 22	4	MAR 22	19	MAY 22	1	JUL 22	11	SEP 22	6	NOV 22	3
JAN 23	2	MAR 23	9	MAY 23	1	JUL 23	5	SEP 23	7	NOV 23	4
JAN 24	8	MAR 24	27	MAY 24	2	JUL 24	2	SEP 24	15	NOV 24	2
JAN 25	16	MAR 25	14	MAY 25	0	JUL 25	2	SEP 25	8	NOV 25	3
JAN 26	21	MAR 26	8	MAY 26	2	JUL 26	4	SEP 26	11	NOV 26	9
JAN 27	8	MAR 27	9	MAY 27	15	JUL 27	7	SEP 27	10	NOV 27	2
JAN 28	7	MAR 28	11	MAY 28	18	JUL 28	5	SEP 28	5	NOV 28	2
JAN 29	5	MAR 29	13	MAY 29	9	JUL 29	14	SEP 29	15	NOV 29	8
JAN 30	10	MAR 30	17	MAY 30	3	JUL 30	5	SEP 30	13	NOV 30	2
JAN 31	40	MAR 31	7	MAY 31	5	JUL 31	3				

DATE	A	DATE	A	DATE	A	DATE	A	DATE	A	DATE	A
FEB 1	21	APR 1	8	JUN 1	4	AUG 1	0	OCT 1	24	DEC 1	15
FEB 2	14	APR 2	5	JUN 2	5	AUG 2	1	OCT 2	6	DEC 2	32
FEB 3	6	APR 3	1	JUN 3	15	AUG 3	3	OCT 3	3	DEC 3	27
FEB 4	6	APR 4	26	JUN 4	37	AUG 4	16	OCT 4	5	DEC 4	4
FEB 5	6	APR 5	66	JUN 5	37	AUG 5	17	OCT 5	5	DEC 5	7
FEB 6	2	APR 6	10	JUN 6	15	AUG 6	18	OCT 6	10	DEC 6	4
FEB 7	18	APR 7	13	JUN 7	16	AUG 7	12	OCT 7	1	DEC 7	4
FEB 8	29	APR 8	17	JUN 8	10	AUG 8	10	OCT 8	14	DEC 8	16
FEB 9	17	APR 9	20	JUN 9	6	AUG 9	11	OCT 9	30	DEC 9	38
FEB 10	11	APR 10	10	JUN 10	19	AUG 10	6	OCT 10	22	DEC 10	0
FEB 11	14	APR 11	9	JUN 11	9	AUG 11	3	OCT 11	21	DEC 11	5
FEB 12	11	APR 12	11	JUN 12	14	AUG 12	6	OCT 12	14	DEC 12	5
FEB 13	9	APR 13	25	JUN 13	12	AUG 13	5	OCT 13	11	DEC 13	5
FEB 14	5	APR 14	17	JUN 14	11	AUG 14	1	OCT 14	6	DEC 14	2
FEB 15	1	APR 15	26	JUN 15	7	AUG 15	8	OCT 15	2	DEC 15	1
FEB 16	8	APR 16	12	JUN 16	2	AUG 16	34	OCT 16	3	DEC 16	7
FEB 17	28	APR 17	8	JUN 17	3	AUG 17	33	OCT 17	5	DEC 17	19
FEB 18	12	APR 18	16	JUN 18	2	AUG 18	19	OCT 18	6	DEC 18	15
FEB 19	7	APR 19	9	JUN 19	3	AUG 19	13	OCT 19	6	DEC 19	9
FEB 20	22	APR 20	23	JUN 20	3	AUG 20	9	OCT 20	3	DEC 20	9
FEB 21	17	APR 21	25	JUN 21	1	AUG 21	5	OCT 21	5	DEC 21	10
FEB 22	18	APR 22	15	JUN 22	2	AUG 22	4	OCT 22	12	DEC 22	13
FEB 23	6	APR 23	9	JUN 23	12	AUG 23	2	OCT 23	11	DEC 23	10
FEB 24	4	APR 24	7	JUN 24	23	AUG 24	3	OCT 24	6	DEC 24	8
FEB 25	6	APR 25	13	JUN 25	17	AUG 25	2	OCT 25	25	DEC 25	7
FEB 26	3	APR 26	4	JUN 26	10	AUG 26	5	OCT 26	17	DEC 26	6
FEB 27	2	APR 27	3	JUN 27	6	AUG 27	16	OCT 27	34	DEC 27	6
FEB 28	21	APR 28	3	JUN 28	4	AUG 28	7	OCT 28	16	DEC 28	3
		APR 29	10	JUN 29	10	AUG 29	9	OCT 29	8	DEC 29	0
		APR 30	11	JUN 30	8	AUG 30	3	OCT 30	2	DEC 30	0
						AUG 31	2	OCT 31	4	DEC 31	2

Low Band Monitor
1993 Boulder "A" Index Study

REPORTED BY: ____________________ (CALL SIGN)

TEN BEST Low Band DAYS

NO.	DATE	ACTIVITY REPORTED
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

LOW BAND MONITOR • P.O. Box 1047 • Elizabeth, CO 80107

Most experienced low band Dxers have found that when the "A" index changes radically in either direction, sometimes some very interesting phenomena occur.

Long path openings, skewed path openings, openings into the Northern latitudes, extremely loud low band signals and openings before sunset or after sunrise.

The "A" Index is used because it is based on a 24 hour measurement period and represents a variation trend that has more weight from a statistical standpoint.

Some Examples - Lets look at a few examples that would support this theory of predicting low band propagation opportunities.

PRIOR "A"	TODAYS "A"	DATE	WHAT OCCURRED
14	6	FEB 3	VR6BB good 160M signal (KY0A)
7	22	FEB 20	UA0ZDA + UA0FZ loud on 80M (K0CS)
2	21	FEB 28	UA0JDX loud on 80M (K0CS)
2	12	JUN 23	FO0AR good 160M signal (KY0A)
10	6	JUN 27	VK4YB etc. loud on 160M (K0CS)
15	8	SEP 25	3D2OH good signal 160 M (K0CS)
5	10	OCT 6	V85PB 20 db over on 75M (K0CS)
8	40	NOV 4	VK9NS on 160M (NI6T)
5	16	NOV 18	JA1CGM on 160M (W8UVZ)
5	16	NOV 18	5Z4FO on 80M (KD7FO)
20	7	NOV 20	ZD8Z ON 160M (W8UVZ)
9	2	NOV 27	RA9OC (Zone 18) on 80M (K9FD)
9	2	NOV 27	UW2F, 7Q7OO, ZB2X ON 80M (K6SSS)
9	2	NOV 27	SM4HCM solid on 80M (WA0GFS)
9	2	NOV 27	C52ZP on 160M (K4KUZ)
8	2	NOV 30	TL8NG on 80M (KD7SO)
8	2	NOV 30	9Y4H loud on 160M (VE7BS)
8	2	NOV 30	4X4NJ on 160M (W8AH)
2	15	DEC 1	9N1HP on 80M (WA0PUJ)
15	32	DEC 2	P29WK loud on 80M (K0CS)
27	4	DEC 4	A45ZZ longpath 80M (N2KK)
27	4	DEC 4	G3FPQ longpath 80M (N2KK)

I hurriedly took these from subscribers low band spots. Notice how the "A" Index is changing significantly in each case but the change is sometimes upward and sometimes downward.

In some cases the "quality" opening continued for a second day and it should be mentioned that the second day often times offered more opportunity, than the original day this method defines.

Conclusion - The actual mechanisms that create a good low band opening obviously are much more complex than the observed parameters that make up the "A" Index. There does seem to be a degree of correlation between a good low band opening and severe changes in the "A" Index. This change is simply the difference in the current days "A" Index compared to the previous days "A" index.

Additional input from readers is requested that would identify what you consider to be the most interesting low band days of 1993. These selected days will be noted, relative to their appropriate "A" Index and then tested against the concept that abrupt changes in the "A" Index induce good low band openings.

We all know that this study will not have a solid correlation in the 90 -95 percent range. However, a modest correlation of 65 - 75 percent might be enough to start low band DXers around the world to get on the low bands more often and more predictably.

Those of you that have strong mathematical backgrounds might even be able to come up with a theory that has more sophistication (time series, cumulative distributions, differential equations, etc.) when we receive additional data.

What do we need from our readers? Simply identify your TEN BEST(low band propagation) DAYS OF 1993 in your own opinion and briefly tell us why. Send the information to the *Low Band Monitor*, P.O. Box 1047, Elizabeth, CO 80107.

What is a good propagation day? Let's define a good propagation day as a day where you are experiencing true long haul DX on either the 80 or 160 meter bands.

CO1RH and FG5BG are nice catches on 160 meters from Texas, but if you live in Texas these would not qualify as long haul DX.

Look for the 10 best days of 1993 based on actual distance and relative signal quality. Hearing a JA station on 75 or 80 meters is not uncommon. Hearing a JA station at 20 -30 db over S9 on these bands is indeed worth noting.

We will accept your TEN BEST DAYS OF 1993data through the first day of March, 1994. Please fill out the form today!

Low Band Monitor Award Winners

W8AH and KY0A Capture Awards

Awards Background - The *Low Band Monitor's* awards program was introduced in the August issue. Three awards are available.

- ***160 Meter Worked All Continents*** - A certificate is available for those who work all the world's continents on top band between September 15, 1993 and April 15, 1994.
- ***80 Meter 100 Countries*** - A certificate is available for those who work 100 countries on the 75/80 meter band between September 15, 1993 and April 15, 1994.
- ***40 Meter 150 Countries*** - A certificate is available for those who work 150 countries on the 40 meter band between September 15, 1993 and April 15, 1994. QSL's are not required for any of these awards, just the operators log data. There is no charge for any of these awards.

These certificates are designed to recognize the true achievers on the low bands and are quite frankly the most beautiful awards that are available in the amateur radio hobby.

160 Meter Worked All Continents - A good horse race developed in this one for the winner of Certificate #1. Charles Summers, KY0A of Colorado and George Taft, W8UVZ of Michigan made the grade three days apart. Charlie's last contact was JA1CGM on November 17th, while George finished his quest on November 20th with ZD8Z.

Charlie's station was featured in the June issue of the *Low Band Monitor*. It features a 160 meter Delta Loop for transmit, a number of Beverage antennas for receiving, an Icom 781, and an Alpha 87 amplifier. It is interesting to note that his first European contact was JW5NM. This contact was made based on a tip from W8UVZ.

Charlie has achieved Top of the Honor Roll and is on the ARRL DX Advisory Committee, representing the Rocky Mountain Region.

One of the most active 160 meter enthusiasts in the U.S., this award is further proof that KY0A is a station to be watched during the upcoming sunspot minimum.

As of December 26th the *Low Band Monitor* has received seven 160 meter submissions. These are listed below for your review.

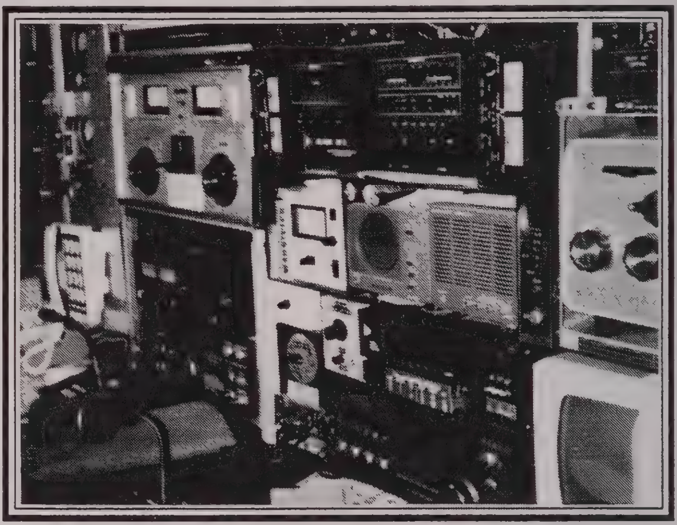
All 160 meter enthusiasts who are subscribers are asked to send us your log data when you complete the six contacts. This will help us measure the 160 meter propagation quality on a worldwide basis.

40 and 80 Meter Award - On Monday, November 28th at 9:45 am., the *Low Band Monitor* received a Federal Express envelope. No, it wasn't my final eviction notice, it was Al Hix's, W8AH submission for both the 40 and 80 meter awards.

If you follow college football you know that this is the year of the "Beast From the East", West Virginia University, one of three teams that still have a chance to win an NCAA championship.

Al, a resident of West Virginia showed a similar intensity in pursuing these awards, with 157 countries worked on 40 meters (all CW) through November 25 and 108 countries (34 SSB + 74 CW) through November 26. Al's station consists of a Kenwood 940, Icom 781 with a remote large screen display, and an Alpha 77 amplifier. His 40 meter antenna is a Mosely 2 element wide spaced beam. For his potent signal on 80 meters, Al uses two phased Hy-Gain 18-HT Hy-Towers with relay switched matching networks.

On 160 meters Al uses a U.S. Tower 55 foot crank up that is shunt fed and has 60 radials. He recently connected the ground system to a 1,400 foot chain link fence and advises that this improved performance.

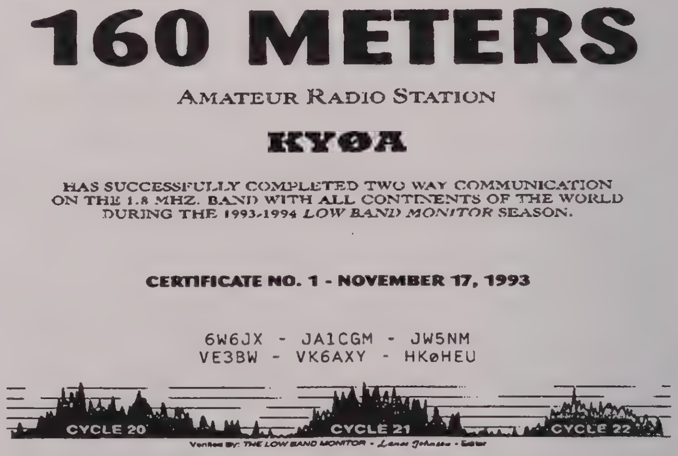


A look inside W8AH's station in Charleston, West Virginia

He uses the famous Collins L matching networks (180Y-1) for each of 5 different antennas and individual antenna tuners for four other antennas.

One of the world's most accomplished DXers, W8AH has been at the top of the ARRL DXCC Honor Rolls in almost every category since their creation. His all time DXCC totals in the last QST listing of 1993 were, Mixed - 369, Phone - 367, CW - 328.

His low band totals are; 160 meters - 211, 80 meters - 303, and 40 meters - 342. He has probably added a few more since his last endorsement was listed. This "Gentleman From the East", has proven his low band DX proficiency again in 1993.



160 METERS

AMATEUR RADIO STATION

KY0A

HAS SUCCESSFULLY COMPLETED TWO WAY COMMUNICATION ON THE 1.8 MHZ. BAND WITH ALL CONTINENTS OF THE WORLD DURING THE 1993-1994 *LOW BAND MONITOR* SEASON.

CERTIFICATE NO. 1 - NOVEMBER 17, 1993

6W6JX - JA1CGM - JW5NM
VE3BW - VK6AXY - HK0HEU

Verified By: *THE LOW BAND MONITOR* - Lance Johnson - Editor

CYCLE 20
CYCLE 21
CYCLE 22

160 METER WORKED ALL CONTINENTS 1993

NO.	CALL	DATE	AFRICA	ASIA	EUROPE	N. AMER.	OCEANIA	S. AMER.
1	**KY0A**	11-17-93	6W6JX	JA1CGM	JW5NM	VE3BW	VK6ACY	HK0HEU
2	**W8UVZ**	11-20-93	ZD8Z	JA1CGM	UB5ZAL	KL7Y	VK4YB	PY0FF
3	**K3ND**	11-27-93	EA9EO	4X/S59PR	ZB2X	VP5RX	KH6CC	P40W
4	**AA6TT**	11-27-93	EA8BR	JH1RES	TM7C	VP5L	3D2OH	HK0HEU
5	**W8AH**	11-30-93	EA9EO	4X4NJ	YO3APJ	FM5BH	KH6XT	9Y4H
6	**W0CD**	11-30-93	ZD8Z	JF1NZW	G3SZA	FJ/F6HWU	3D2AW	P40W
7	**K0CS**	12-03-93	6W6JX	4X4NJ	PA0HIP	V31DX	KH6CC	9Y4H

LOW BAND MONITOR POWER SPOTS - CQWWCW 1993

TNX: N8HTT - W8TN - K4KUZ - N2KK - K6SSS

160 METERS

1833.0	ZF2WW	28-Nov-1993	2305Z
1843.3	GB5DX	28-Nov-1993	2259Z
1830.1	4X4NJ	28-Nov-1993	2258Z
1842.6	US0Q	28-Nov-1993	2253Z
1844.4	EA9EO	28-Nov-1993	2252Z
1833.4	OY9JD	28-Nov-1993	2256Z
1829.3	GW3YDX	28-Nov-1993	2251Z
1823.4	GI0KOW	28-Nov-1993	2250Z
1825.4	SM4CAN	28-Nov-1993	2238Z
1826.1	EI7M	28-Nov-1993	2237Z
1827.0	SV2BFN	28-Nov-1993	2236Z
1908.8	JF1NZW	28-Nov-1993	1315Z
1824.0	JA8OEM	28-Nov-1993	1219Z
1830.6	VK3AJJ	28-Nov-1993	1109Z
1837.0	YS1X	28-Nov-1993	1019Z
1834.2	VP2VA	28-Nov-1993	1009Z
1833.0	C6A/N4RP	28-Nov-1993	0929Z
1826.8	KV4FZ	28-Nov-1993	0917Z
1822.1	J6DX	28-Nov-1993	0901Z
1827.9	OK4DX	28-Nov-1993	0836Z
1832.6	TI1C	28-Nov-1993	0804Z
1836.8	KH6AT	28-Nov-1993	0759Z
1824.3	V31KF	28-Nov-1993	0758Z
1827.0	CO1RH	28-Nov-1993	0720Z
1835.5	9Y4H	28-Nov-1993	0709Z
1847.2	GI0KOW	28-Nov-1993	0641Z
1834.1	9Y4H	28-Nov-1993	0633Z
1830.0	ZF2WW	28-Nov-1993	0631Z
1850.1	LY7A	28-Nov-1993	0630Z
1843.9	YL2IP	28-Nov-1993	0633Z
1838.5	VP9AD	28-Nov-1993	0628Z
1831.5	UW2F	28-Nov-1993	0628Z
1831.4	V31KF	28-Nov-1993	0626Z
1827.9	SM5EDX	28-Nov-1993	0626Z
1839.2	V31KF	28-Nov-1993	0623Z
1824.0	SM6CPY	28-Nov-1993	0617Z
1818.8	9A2TW	28-Nov-1993	0604Z
1838.2	EA8EA	28-Nov-1993	0601Z
1832.0	HG73DX	28-Nov-1993	0601Z
1831.4	L40F	28-Nov-1993	0556Z
1828.7	KH6CC	28-Nov-1993	0556Z
1827.3	CO1RH	28-Nov-1993	0554Z
1821.4	GW3YDX	28-Nov-1993	0547Z
1827.1	GI0KOW	28-Nov-1993	0545Z
1830.3	DF0DF	28-Nov-1993	0538Z
1844.4	4M5I	28-Nov-1993	0538Z
1845.2	OK1DOT	28-Nov-1993	0535Z
1842.0	UW2F	28-Nov-1993	0532Z
1833.7	IT9ZGY	28-Nov-1993	0532Z
1830.2	IV3PRK	28-Nov-1993	0529Z
1840.7	VE2BQB	28-Nov-1993	0520Z
1846.1	OK1DRU	28-Nov-1993	0523Z
1828.0	SM5EDX	28-Nov-1993	0524Z
1838.1	9A2TW	28-Nov-1993	0521Z
1839.1	TI1C	28-Nov-1993	0518Z
1838.1	ZD8Z	28-Nov-1993	0511Z
1823.6	YU7AV	28-Nov-1993	0513Z
1835.1	YL2QD	28-Nov-1993	0508Z
1839.6	OZ1LO	28-Nov-1993	0506Z
1835.9	SM6DOI	28-Nov-1993	0505Z
1839.7	9A1A	28-Nov-1993	0503Z
1815.0	ZA/OK2PSZ	28-Nov-1993	0501Z
1844.0	HA8EK	28-Nov-1993	0457Z
1842.7	OH1MA	28-Nov-1993	0447Z
1834.8	DK7SU	28-Nov-1993	0443Z
1830.7	G3RBP	28-Nov-1993	0440Z
1831.2	ON5NT	28-Nov-1993	0439Z
1826.1	GW3YDX	28-Nov-1993	0430Z
1832.2	YO3APJ	28-Nov-1993	0427Z
1837.5	4N1Z	28-Nov-1993	0424Z
1836.0	C52ZP	28-Nov-1993	0418Z
1838.2	9Y4H	28-Nov-1993	0416Z
1828.8	ED3KU	28-Nov-1993	0415Z
1833.1	VP9AD	28-Nov-1993	0414Z
1836.7	EA9EO	28-Nov-1993	0413Z
1836.3	8R1K	28-Nov-1993	0409Z
1828.1	IT9ZGY	28-Nov-1993	0406Z
1827.9	FJ/F8UFT	28-Nov-1993	0404Z

160 METERS

1829.3	KH6CC	28-Nov-1993	0403Z
1837.8	F6CWA	28-Nov-1993	0358Z
1834.8	US0Q	28-Nov-1993	0354Z
1833.2	OY9JD	28-Nov-1993	0351Z
1827.9	FJ/F8UFT	28-Nov-1993	0348Z
1824.0	CT1AOZ	28-Nov-1993	0321Z
1826.0	VK6HD	27-Nov-1993	1141Z
1837.9	FK8CP	27-Nov-1993	1124Z
1825.0	TI4C	27-Nov-1993	1032Z
1836.7	VP2VA	27-Nov-1993	0936Z
1825.8	YS1X	27-Nov-1993	1021Z
1835.1	P40N	27-Nov-1993	1025Z
1834.7	VP9AD	27-Nov-1993	1018Z
1838.9	J6DX	27-Nov-1993	0907Z
1836.1	YS1X	27-Nov-1993	0906Z
1834.0	V47KP	28-Nov-1993	1006Z
1833.9	N6VI/KH6	27-Nov-1993	1002Z
1825.9	KV4FZ	27-Nov-1993	0947Z
1831.4	FM5BH	27-Nov-1993	0943Z
1836.7	VP2VA	27-Nov-1993	0944Z
1835.3	OK4DXS/MM	27-Nov-1993	0929Z
1830.9	HI8LC	27-Nov-1993	0922Z
1824.9	8R1K	27-Nov-1993	0913Z
1819.9	VP9MZ	27-Nov-1993	0909Z
1827.5	P40N	27-Nov-1993	0907Z
1828.4	KH6CC	27-Nov-1993	0903Z
1823.0	4M5I	27-Nov-1993	0849Z
1838.8	J6DX	27-Nov-1993	0835Z
1823.9	PJ2/WJ2O	27-Nov-1993	0824Z
1833.5	OY9JD	27-Nov-1993	0809Z
1831.1	FM5BH	27-Nov-1993	0813Z
1835.0	TI1C	27-Nov-1993	0808Z
1837.2	GI0KOW	27-Nov-1993	0808Z
1832.4	GW3YDX	27-Nov-1993	0744Z
1831.9	VP9AD	27-Nov-1993	0743Z
1833.8	VP5RX	27-Nov-1993	0744Z
1828.6	CT1AOZ	27-Nov-1993	0732Z
1833.1	P40W	27-Nov-1993	0730Z
1836.6	9Y4H	27-Nov-1993	0727Z
1826.0	HI8LC	27-Nov-1993	0721Z
1826.0	KH6CC	27-Nov-1993	0716Z
1831.8	VP9AD	27-Nov-1993	0702Z
1830.2	OE6IMD	27-Nov-1993	0511Z
1831.4	UR8J	27-Nov-1993	0510Z
1829.2	YO3APJ	27-Nov-1993	0510Z
1826.4	IT9ZGY	27-Nov-1993	0505Z
1811.7	OE5KE	27-Nov-1993	0507Z
1821.0	YU7AU	27-Nov-1993	0500Z
1848.1	4N1Z	27-Nov-1993	0457Z
1816.5	OM3TKW	27-Nov-1993	0457Z
1850.6	HA8EK	27-Nov-1993	0456Z
1846.6	F6CWA	27-Nov-1993	0453Z
1827.0	GM0RHP	27-Nov-1993	0443Z
1831.9	G3LNS	27-Nov-1993	0441Z
1823.2	S50L	27-Nov-1993	0453Z
1824.0	S51BO	27-Nov-1993	0438Z
1825.9	SM6DOI	27-Nov-1993	0449Z
1833.9	LZ9A	27-Nov-1993	0437Z
1817.8	9A1A	27-Nov-1993	0439Z
1832.2	4X4NJ	27-Nov-1993	0108Z
1823.0	GI0KOW	27-Nov-1993	0045Z

80 METERS

3536.9	UW2F	28-Nov-1993	2303Z
3508.2	T94ON	28-Nov-1993	2305Z
3520.2	OL1A	28-Nov-1993	2305Z
3501.3	GM0ECO	28-Nov-1993	2302Z
3515.0	II1D	28-Nov-1993	2255Z
3505.0	S51OJ	28-Nov-1993	2323Z
3503.0	YL2GD	28-Nov-1993	1422Z
3503.0	UN5J	28-Nov-1993	1421Z
3525.4	JH7PKU	28-Nov-1993	1318Z
3505.4	VK5ZN/4	28-Nov-1993	1316Z
3520.4	JA1YDU	28-Nov-1993	1316Z
3512.0	AH0K	28-Nov-1993	1257Z
3507.9	JH1BBT	28-Nov-1993	1244Z
3503.8	VK5ZN/4	28-Nov-1993	1240Z

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3508.7	JH5FXP	28-Nov-1993	1237Z
3523.5	JH1OGC	28-Nov-1993	1225Z
3505.5	ZL2K	28-Nov-1993	1220Z
3513.8	NL7G	28-Nov-1993	1216Z
3515.0	HS0AC	28-Nov-1993	1214Z
3517.0	T32BE	28-Nov-1993	1206Z
3520.5	JA1YDU	28-Nov-1993	1203Z
3512.1	AH0K	28-Nov-1993	1202Z
3508.1	RA1ZA	28-Nov-1993	1157Z
3517.0	VP9MZ	28-Nov-1993	1155Z
3520.0	JH1OGC	28-Nov-1993	1146Z
3503.8	VK2BQQ	28-Nov-1993	1145Z
3522.0	V31KF	28-Nov-1993	1141Z
3525.5	V47KP	28-Nov-1993	1127Z
3501.3	TI1C	28-Nov-1993	1129Z
3799.3	VK3DZM	28-Nov-1993	1128Z
3504.0	T30RT	28-Nov-1993	1115Z
3520.0	V73C	28-Nov-1993	1103Z
3505.9	C57CC	28-Nov-1993	1059Z
3518.0	OA4ZV	28-Nov-1993	1039Z
3505.5	FM5BH	28-Nov-1993	1029Z
3526.1	NP2A	28-Nov-1993	1026Z
3503.6	C6AAF	28-Nov-1993	1021Z
3799.0	OY9JD	28-Nov-1993	1011Z
3520.7	JA7YAA	28-Nov-1993	1010Z
3526.1	NP4A	28-Nov-1993	1007Z
3519.2	V31KF	28-Nov-1993	1002Z
3516.0	CM2PL	28-Nov-1993	1001Z
3519.3	PJ5JP	28-Nov-1993	0946Z
3509.2	JA1NUT	28-Nov-1993	0941Z
3531.2	VP2E/N4CD	28-Nov-1993	0941Z
3536.9	NL7G	28-Nov-1993	0936Z
3531.0	C6A/N4RP	28-Nov-1993	0929Z
3515.0	FM5CW	28-Nov-1993	0926Z
3515.9	J6DX	28-Nov-1993	0925Z
3503.7	ZL2K	28-Nov-1993	0922Z
3500.4	OJ0/OH1VR	28-Nov-1993	0818Z
3522.1	LA7JO	28-Nov-1993	0813Z
3516.7	FY0EK	28-Nov-1993	0810Z
3509.9	G5LP	28-Nov-1993	0809Z
3518.6	EA7KW	28-Nov-1993	0809Z
3504.9	FJ/F8UFT	28-Nov-1993	0806Z
3515.8	6V6U	28-Nov-1993	0804Z
3544.6	EI7M	28-Nov-1993	0757Z
3539.0	ZF2JJ	28-Nov-1993	0755Z
3537.5	G3BPM	28-Nov-1993	0754Z
3530.3	DJ4AX	28-Nov-1993	0738Z
3556.2	G3VMW	28-Nov-1993	0727Z
3535.9	EA8EA	28-Nov-1993	0710Z
3507.7	FJ/F8UFT	28-Nov-1993	0659Z
3501.9	V73C	28-Nov-1993	0657Z
3569.4	LY4CW	28-Nov-1993	0652Z
3520.1	P40W	28-Nov-1993	0637Z
3509.7	OL1A	28-Nov-1993	0636Z
3510.3	OM3PA	28-Nov-1993	0617Z
3794.0	OE6MBG	28-Nov-1993	0605Z
3503.0	YS1X	28-Nov-1993	0604Z
3506.2	ON4UN	28-Nov-1993	0600Z
3506.5	OE3GSA	28-Nov-1993	0557Z
3515.7	8R1K	28-Nov-1993	0554Z
3523.8	CR3W	28-Nov-1993	0553Z
3513.0	LY1CX	28-Nov-1993	0543Z
3526.7	PI4COM	28-Nov-1993	0542Z
3506.8	EA6GP	28-Nov-1993	0532Z
3796.5	SM5SB	28-Nov-1993	0524Z
3541.0	ED3KU	28-Nov-1993	0523Z
3536.9	HG6V	28-Nov-1993	0520Z
3535.6	S51BO	28-Nov-1993	0520Z
3556.8	OL1CW	28-Nov-1993	0521Z
3527.4	UW2F	28-Nov-1993	0516Z
3527.8	9A1A	28-Nov-1993	0516Z
3560.1	OZ5WQ	28-Nov-1993	0514Z
3500.5	OJ0/OH1VR	28-Nov-1993	0507Z
3566.6	P40N	28-Nov-1993	0505Z
3519.3	EA9EO	28-Nov-1993	0459Z
3542.2	Z30M	28-Nov-1993	0456Z
3504.8	YL1WW	28-Nov-1993	0454Z
3508.1	UR8J	28-Nov-1993	0452Z

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3543.9	T94ON	28-Nov-1993	0451Z
3519.4	TM9C	28-Nov-1993	0448Z
3513.9	DL0KF	28-Nov-1993	0447Z
3539.0	ZF2WW	28-Nov-1993	0446Z
3791.5	YS1AG	28-Nov-1993	0443Z
3548.7	LY3BS	28-Nov-1993	0450Z
3518.1	VO2GUY	28-Nov-1993	0441Z
3567.1	KP4TK	28-Nov-1993	0447Z
3571.1	EI7M	28-Nov-1993	0445Z
3514.4	4X/S59PR	28-Nov-1993	0436Z
3549.4	G3MXJ	28-Nov-1993	0432Z
3550.0	GM3YTS	28-Nov-1993	0432Z
3569.0	S59CAB	28-Nov-1993	0425Z
3500.5	OJ0/OH1VR	28-Nov-1993	0420Z
3545.1	HH2PK	28-Nov-1993	0418Z
3512.2	CR3W	28-Nov-1993	0416Z
3511.4	TK5NN	28-Nov-1993	0416Z
3531.8	KH6XT	28-Nov-1993	0426Z
3529.2	PI4CC	28-Nov-1993	0423Z
3531.8	KH6XT	28-Nov-1993	0414Z
3554.0	OM3KAG	28-Nov-1993	0410Z
3542.0	LZ1KOZ	28-Nov-1993	0412Z
3531.7	V31KF	28-Nov-1993	0409Z
3548.5	LY3BS	28-Nov-1993	0407Z
3796.0	HI8OMA	28-Nov-1993	0403Z
3547.4	ER7Z	28-Nov-1993	0359Z
3531.1	4M5I	28-Nov-1993	0357Z
3551.5	TM6AR	28-Nov-1993	0358Z
3570.2	UC2ACZ	28-Nov-1993	0354Z
3519.5	TM9C	28-Nov-1993	0356Z
3549.7	OX3RA	28-Nov-1993	0349Z
3523.0	4O9S	28-Nov-1993	0347Z
3526.1	EA7KW	28-Nov-1993	0346Z
3522.6	S51OJ	28-Nov-1993	0342Z
3509.5	ZF2WW	28-Nov-1993	0336Z
3508.5	G6HDX	28-Nov-1993	0334Z
3507.8	I3ISS	28-Nov-1993	0333Z
3527.1	9A1A	28-Nov-1993	0329Z
3513.6	DA2UK	28-Nov-1993	0320Z
3531.9	OM3RKA	28-Nov-1993	0323Z
3537.6	DL2GG/YV5	28-Nov-1993	0258Z
3539.5	SN3A	28-Nov-1993	0253Z
3536.0	LY1CX	28-Nov-1993	0231Z
3531.0	IQ4A	28-Nov-1993	0227Z
3512.1	CR3W	28-Nov-1993	0221Z
3505.5	HG73DX	28-Nov-1993	0219Z
3500.0	EA8EZ	28-Nov-1993	0216Z
3541.1	YL2WW	28-Nov-1993	0201Z
3527.1	9A2A	28-Nov-1993	0157Z
3501.4	ZB2X	28-Nov-1993	0139Z
3555.8	4O7AV	28-Nov-1993	0134Z
3510.5	ON4UN	28-Nov-1993	0132Z
3553.3	VE2DYX	28-Nov-1993	0126Z
3524.5	XE1VV	28-Nov-1993	0126Z
3552.0	S59KW	28-Nov-1993	0117Z
3550.1	HG6V	28-Nov-1993	0116Z
3548.3	IR3X	28-Nov-1993	0109Z
3541.3	UW3F	28-Nov-1993	0108Z
3519.7	SV4CW	28-Nov-1993	0103Z
3538.2	IN3A	28-Nov-1993	0102Z
3514.6	I3JSS	28-Nov-1993	0055Z
3553.2	LU8DZJ	28-Nov-1993	0049Z
3541.5	IR2XT	28-Nov-1993	0043Z
3538.6	SM3A	28-Nov-1993	0040Z
3537.5	DL3BQM	28-Nov-1993	0035Z
3529.9	EA9EO	28-Nov-1993	0029Z
3520.0	S54CW	28-Nov-1993	0027Z
3505.0	HG73DX	27-Nov-1993	2234Z
3511.0	TM9C	27-Nov-1993	2215Z
3508.0	EA7EZ	27-Nov-1993	2209Z
3507.5	4U1UN	27-Nov-1993	2157Z
3511.0	JA1YDU	27-Nov-1993	1321Z
3501.0	UA0FZ	27-Nov-1993	1245Z
3517.5	KH6XT	27-Nov-1993	1224Z
3511.5	XE1/AA6RX	27-Nov-1993	1218Z
3504.9	T32BE	27-Nov-1993	1152Z
3515.5	VS6WO	27-Nov-1993	1141Z
3513.5	UA1ZO	27-Nov-1993	1125Z

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3511.4	V73C	27-Nov-1993	1126Z
3509.5	UN5J	27-Nov-1993	1119Z
3520.0	ZL7FD	27-Nov-1993	1116Z
3528.9	YS1X	27-Nov-1993	1032Z
3540.4	CL3ZD	27-Nov-1993	1032Z
3518.0	HD9N	27-Nov-1993	1026Z
3506.7	JA3YKC	27-Nov-1993	0935Z
3538.4	C6A/N4RP	27-Nov-1993	0930Z
3543.2	CL3ZD	27-Nov-1993	0928Z
3518.0	HD9N	27-Nov-1993	1022Z
3505.8	8R1K	27-Nov-1993	0921Z
3504.6	RA1ZT	27-Nov-1993	1020Z
3515.9	ZL2K	27-Nov-1993	0918Z
3502.0	VP5RX	27-Nov-1993	0919Z
3501.6	VP5RX	27-Nov-1993	0908Z
3532.0	NP2Q	27-Nov-1993	1019Z
3501.1	JA1TNV	27-Nov-1993	1014Z
3516.0	JA7YAB	27-Nov-1993	1010Z
3538.6	PJ2/WJ2O	27-Nov-1993	0902Z
3541.6	VP9MZ	27-Nov-1993	0901Z
3513.6	DL6KVA/6Y5	27-Nov-1993	0850Z
3541.4	VP9MZ	27-Nov-1993	0911Z
3515.0	JH7PKU	27-Nov-1993	1007Z
3512.7	9Y4H	27-Nov-1993	1003Z
3528.6	P40N	27-Nov-1993	1001Z
3516.0	NL7G	27-Nov-1993	1001Z
3515.7	ZL2K	27-Nov-1993	0945Z
3500.9	YS1X	27-Nov-1993	0942Z
3799.6	JF1IST	27-Nov-1993	0940Z
3530.1	4M5I	27-Nov-1993	0932Z
3505.6	8R1K	27-Nov-1993	0934Z
3503.1	EA9EO	27-Nov-1993	0926Z
3538.9	C6A/N4RP	27-Nov-1993	0922Z
3529.7	HK1AMW	27-Nov-1993	0930Z
3515.7	ZL2K	27-Nov-1993	0923Z
3513.5	DL6KVA/6Y5	27-Nov-1993	0919Z
3501.9	VP5RX	27-Nov-1993	0918Z
3529.8	NP2Q	27-Nov-1993	0911Z
3523.4	KH6XT	27-Nov-1993	0908Z
3529.9	NP2Q	27-Nov-1993	0900Z
3521.6	CM2PK	27-Nov-1993	0851Z
3538.4	PJ2/WJ2O	27-Nov-1993	0850Z
3508.8	NH6T	27-Nov-1993	0846Z
3507.4	PZ1DY	27-Nov-1993	0851Z
3516.9	LU8DZJ	27-Nov-1993	0843Z
3513.5	DL6KVA/6Y5	27-Nov-1993	0850Z
3547.2	C59DH	27-Nov-1993	0840Z
3506.4	TI1C	27-Nov-1993	0837Z
3527.2	LO3A	27-Nov-1993	0832Z
3541.4	VP9MZ	27-Nov-1993	0832Z
3535.5	EA9EO	27-Nov-1993	0839Z
3794.0	OZ1BTE	27-Nov-1993	0832Z
3522.0	9Y4H	27-Nov-1993	0828Z
3526.7	PI4ZLD	27-Nov-1993	0825Z
3527.0	KH6XT	27-Nov-1993	0816Z
3523.0	DL6KVA/6Y5	27-Nov-1993	0814Z
3507.3	HK1HHX	27-Nov-1993	0810Z
3503.0	P40J	27-Nov-1993	0807Z
3507.7	FY0EK	27-Nov-1993	0804Z
3523.7	VP5RX	27-Nov-1993	0806Z
3530.6	GB5WW	27-Nov-1993	0801Z
3524.6	EI4SM	27-Nov-1993	0757Z
3534.0	ZB2X	27-Nov-1993	0753Z
3505.4	CR3W	27-Nov-1993	0759Z
3527.6	NP4Z	27-Nov-1993	0749Z
3524.5	EI4HM	27-Nov-1993	0755Z
3506.6	4U1UN	27-Nov-1993	0746Z
3559.0	VP2E/N4CD	27-Nov-1993	0742Z
3536.1	G3BPM	27-Nov-1993	0741Z
3518.5	GJ/K2WR	27-Nov-1993	0738Z
3537.3	9A1A	27-Nov-1993	0739Z
3549.2	4M5I	27-Nov-1993	0739Z
3520.4	V31KF	27-Nov-1993	0734Z
3538.4	I3JSS	27-Nov-1993	0735Z
3539.3	LA9HW	27-Nov-1993	0733Z
3558.4	HD9N	27-Nov-1993	0740Z
3525.1	FJ/F8UFT	27-Nov-1993	0731Z
3539.9	G3BUO	27-Nov-1993	0732Z

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3509.3	LY3BX	27-Nov-1993	0728Z
3550.6	NP2I	27-Nov-1993	0731Z
3545.0	VP9MZ	27-Nov-1993	0729Z
3540.4	GM0/NX1T	27-Nov-1993	0724Z
3509.3	PY0F	27-Nov-1993	0725Z
3537.2	KH6XT	27-Nov-1993	0721Z
3504.2	HB9AGA	27-Nov-1993	0719Z
3524.2	XE1/AA6RX	27-Nov-1993	0719Z
3512.0	DL0KF	27-Nov-1993	0717Z
3516.5	EA5WU	27-Nov-1993	0712Z
3507.9	FY0EK	27-Nov-1993	0713Z
3506.7	TI2C	27-Nov-1993	0711Z
3513.7	OT3A	27-Nov-1993	0709Z
3507.4	P40W	27-Nov-1993	0710Z
3524.3	PJ2/WJ2O	27-Nov-1993	0704Z
3506.8	TI1C	27-Nov-1993	0707Z
3535.3	WP4IEP	27-Nov-1993	0702Z
3516.6	6V6U	27-Nov-1993	0654Z
3526.1	EA9EO	27-Nov-1993	0500Z
3515.5	P40J	27-Nov-1993	0652Z
3527.6	TK5NN	27-Nov-1993	0646Z
3514.9	4U1UN	27-Nov-1993	0651Z
3507.4	P40W	27-Nov-1993	0647Z
3512.4	EA8EA	27-Nov-1993	0644Z
3509.3	4U1ITU	27-Nov-1993	0637Z
3518.1	GB5DX	27-Nov-1993	0527Z
3520.2	VP9/WB8YJF	27-Nov-1993	0500Z
3520.4	WB8YJF/VP9	27-Nov-1993	0506Z
3520.8	9Y4H	27-Nov-1993	0455Z
3550.9	RB5QDW	27-Nov-1993	0509Z
3552.2	LY3BS	27-Nov-1993	0506Z
3541.4	OZ1LO	27-Nov-1993	0441Z
3552.1	LY3BS	27-Nov-1993	0503Z
3568.0	G3TXF	27-Nov-1993	0443Z
3521.3	Z30M	27-Nov-1993	0446Z
3553.6	UB5IG	27-Nov-1993	0437Z
3522.4	4U1ITU	27-Nov-1993	0455Z
3527.3	TK5NN	27-Nov-1993	0447Z
3532.1	DL2NBU	27-Nov-1993	0358Z
3521.0	ZB2X	27-Nov-1993	0309Z
3529.0	XM4VV	27-Nov-1993	0254Z
3532.0	LY1CX	27-Nov-1993	0250Z
3560.0	TM4P	27-Nov-1993	0235Z
3513.4	WB8YJF/VP9	27-Nov-1993	0225Z
3524.0	CR3W	27-Nov-1993	0209Z
3515.6	4N1Z	27-Nov-1993	0159Z
3513.2	OE3GSA	27-Nov-1993	0152Z
3511.9	EA7XC	27-Nov-1993	0148Z
3511.3	YT1BB	27-Nov-1993	0144Z
3550.0	7Q7OO	27-Nov-1993	0110Z
3554.8	ZS6NW	27-Nov-1993	0103Z
3548.0	SN3A	27-Nov-1993	0053Z
3545.4	LY2IJ	27-Nov-1993	0033Z
3507.5	P40X	27-Nov-1993	0028Z
3520.7	GB5DX	27-Nov-1993	0034Z
3516.5	HG73DX	27-Nov-1993	0025Z
3512.4	DL6KVA/6Y5	27-Nov-1993	0022Z
3509.7	DF0HX	27-Nov-1993	0020Z
3526.2	EA9EO	27-Nov-1993	0012Z
3513.8	S51OJ	27-Nov-1993	0010Z
3506.1	ON4UN	27-Nov-1993	0004Z
3507.2	OM3NA	27-Nov-1993	0003Z
3517.9	DK2OY	26-Nov-1993	2358Z
3509.2	TK5NN	27-Nov-1993	0003Z

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7060.0	8R1K	28-Nov-1993	2306Z
7041.7	ZB2X	28-Nov-1993	2307Z
7063.0	RB5QDP	28-Nov-1993	2305Z
7062.3	7Z2AB	28-Nov-1993	2305Z
7042.5	US7I	28-Nov-1993	2304Z
7040.9	V47KP	28-Nov-1993	2303Z
7059.2	TM6GG	28-Nov-1993	2301Z
7044.4	KP4TQ	28-Nov-1993	2353Z
7050.7	OH1AF	28-Nov-1993	2300Z
7033.1	YT1AD	28-Nov-1993	2309Z
7050.6	OM3KAG	28-Nov-1993	2300Z

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40 METERS

7019.3	LZ9A	28-Nov-1993	2257Z
7024.2	VE2EAK	28-Nov-1993	2303Z
7056.7	R6L	28-Nov-1993	2256Z
7000.4	ED6XXX	28-Nov-1993	2252Z
7033.4	LZ3ZL	28-Nov-1993	2258Z
7020.1	HH2PK	28-Nov-1993	2257Z
7021.3	4U1ITU	28-Nov-1993	2257Z
7051.4	OM3KAG	28-Nov-1993	2252Z
7053.7	LX4B	28-Nov-1993	2251Z
7019.5	VS6WO	28-Nov-1993	2254Z
7020.4	4X/S59PR	28-Nov-1993	2254Z
7047.1	UB4HO	28-Nov-1993	2249Z
7020.2	XX9AS	28-Nov-1993	2233Z
7055.2	9A3IQ	28-Nov-1993	2250Z
7041.5	4O7AV	28-Nov-1993	2250Z
7033.3	JY8UJ	28-Nov-1993	2244Z
7030.6	FJ/F8UFT	28-Nov-1993	2242Z
7022.6	9A2NW	28-Nov-1993	2241Z
7059.6	VQ9KC	28-Nov-1993	2242Z
7003.0	YO6KNW	28-Nov-1993	2220Z
7002.2	EA8NQ	28-Nov-1993	2211Z
7030.4	4U1ITU	28-Nov-1993	2132Z
7041.8	LZ1ZX	28-Nov-1993	2121Z
7038.0	R6Y	28-Nov-1993	2118Z
7034.4	UB5CDX	28-Nov-1993	2116Z
7025.8	TF3CW	28-Nov-1993	2105Z
7023.0	UH8EA	28-Nov-1993	2055Z
7022.5	T77C	28-Nov-1993	2053Z
7019.6	OT3A	28-Nov-1993	2045Z
7032.9	HZ1AB	28-Nov-1993	1507Z
7044.5	T30RT	28-Nov-1993	1424Z
7014.4	UA0JQ	28-Nov-1993	1408Z
7033.7	AH0K	28-Nov-1993	1337Z
7009.9	VQ9QM	28-Nov-1993	1329Z
7014.0	UA0JQ	28-Nov-1993	1329Z
7009.9	ZL7FD	28-Nov-1993	1323Z
7002.1	VU2MTT	28-Nov-1993	1311Z
7027.0	V73C	28-Nov-1993	1301Z
7005.7	LY7A	28-Nov-1993	1256Z
7029.9	HH2PK	28-Nov-1993	1249Z
7040.0	OH3NE	28-Nov-1993	1248Z
7000.5	T32BE	28-Nov-1993	1248Z
7002.2	VU2PTT	28-Nov-1993	1243Z
7026.9	UA9AM	28-Nov-1993	1238Z
7006.7	UI8I	28-Nov-1993	1231Z
7006.8	VS6WO	28-Nov-1993	1219Z
7019.3	XX9AS	28-Nov-1993	1220Z
7016.0	UN8LW	28-Nov-1993	1216Z
7034.0	AH0K	28-Nov-1993	1210Z
7022.5	UA9AM	28-Nov-1993	1208Z
7016.5	5K1R	28-Nov-1993	1207Z
7000.8	HP1XQN	28-Nov-1993	1207Z
7034.1	V47KP	28-Nov-1993	1201Z
7034.0	RU1A	28-Nov-1993	1156Z
7011.9	VK6LW	28-Nov-1993	1144Z
7036.3	RU1A	28-Nov-1993	1141Z
7026.4	OY1CT	28-Nov-1993	1138Z
7008.6	UA9AM	28-Nov-1993	1132Z
7008.7	UN8LW	28-Nov-1993	1133Z
7012.5	OA4CWR	28-Nov-1993	1056Z
7033.1	VS6WO	28-Nov-1993	1054Z
7002.0	T30RT	28-Nov-1993	1050Z
7045.1	TG/EA4KT	28-Nov-1993	1036Z
7038.1	DL6KVA/6Y5	28-Nov-1993	1032Z
7036.4	8R1K	28-Nov-1993	1018Z
7026.0	AH0K	28-Nov-1993	1000Z
7001.2	OT3A	28-Nov-1993	0947Z
7007.4	FJ/F8UFT	28-Nov-1993	0935Z
7012.9	EI4HM	28-Nov-1993	0840Z
7021.9	UW0LH	28-Nov-1993	0838Z
7037.4	JW8XM	28-Nov-1993	0830Z
7015.0	LX4B	28-Nov-1993	0827Z
7043.9	HD9N	28-Nov-1993	0759Z
7020.0	JW8XM	28-Nov-1993	0742Z
7009.0	ZB2X	28-Nov-1993	0744Z
7006.1	PY0F	28-Nov-1993	0740Z
7043.0	HD9N	28-Nov-1993	0723Z
7043.8	CX9AU	28-Nov-1993	0720Z

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7015.0	6V6U	28-Nov-1993	0718Z
7025.6	EA9EO	28-Nov-1993	0710Z
7011.5	OM3RM	28-Nov-1993	0700Z
7032.9	ZB2X	28-Nov-1993	0613Z
7036.3	US7I	28-Nov-1993	0607Z
7006.5	V44KAO	28-Nov-1993	0606Z
7002.8	ZD8Z	28-Nov-1993	0550Z
7055.0	4K2MAL	28-Nov-1993	0540Z
7030.5	XE1/AA6RX	28-Nov-1993	0501Z
7004.0	SP6YAQ	28-Nov-1993	0500Z
7032.9	TG/EA4KT	28-Nov-1993	0459Z
7005.5	LX/DF0BK	28-Nov-1993	0447Z
7000.3	ZL7FD	28-Nov-1993	0454Z
7002.3	CO2JD	28-Nov-1993	0446Z
7017.5	ER1A	28-Nov-1993	0448Z
7037.0	A22MN	28-Nov-1993	0447Z
7047.8	PJ9Y	28-Nov-1993	0450Z
7045.7	ZB2X	28-Nov-1993	0446Z
7002.7	PJ8NA	28-Nov-1993	0446Z
7031.6	S50S	28-Nov-1993	0443Z
7000.9	L40F	28-Nov-1993	0440Z
7002.2	PJ2/WJ2O	28-Nov-1993	0434Z
7010.1	ZS1AAX	28-Nov-1993	0432Z
7014.5	CR3W	28-Nov-1993	0431Z
7027.0	C41A	28-Nov-1993	0427Z
7036.9	WD5N/HC8	28-Nov-1993	0428Z
7025.8	EA9EO	28-Nov-1993	0426Z
7044.8	PA3EBT	28-Nov-1993	0428Z
7048.4	XR1X	28-Nov-1993	0421Z
7047.8	PJ9Y	28-Nov-1993	0419Z
7045.1	CX9AU	28-Nov-1993	0422Z
7051.0	HD9N	28-Nov-1993	0417Z
7018.9	OL1A	28-Nov-1993	0421Z
7027.9	OH7W	28-Nov-1993	0414Z
7054.1	FS4PL	28-Nov-1993	0419Z
7028.7	RU1A	28-Nov-1993	0414Z
7029.4	4O9S	28-Nov-1993	0413Z
7031.8	LX4B	28-Nov-1993	0413Z
7046.6	LZ1KBB	28-Nov-1993	0414Z
7034.5	GU3HFN	28-Nov-1993	0412Z
7044.3	7Q7XX	28-Nov-1993	0414Z
7037.3	A22MN	28-Nov-1993	0416Z
7045.2	NP4Z	28-Nov-1993	0410Z
7050.0	4K2MAL	28-Nov-1993	0406Z
7011.6	6V6U	28-Nov-1993	0409Z
7002.2	T32BE	28-Nov-1993	0411Z
7041.1	PY0F	28-Nov-1993	0411Z
7063.1	ZS6EZ	28-Nov-1993	0407Z
7006.1	S59WA	28-Nov-1993	0404Z
7002.9	HZ1AB	28-Nov-1993	0407Z
7045.7	ZB2X	28-Nov-1993	0406Z
7044.1	7Q7XX	28-Nov-1993	0359Z
7045.4	TG/EA4KT	28-Nov-1993	0405Z
7038.5	7Q7OO	28-Nov-1993	0359Z
7058.8	V47KP	28-Nov-1993	0403Z
7008.0	ZD8Z	28-Nov-1993	0353Z
7025.9	EA8EA	28-Nov-1993	0357Z
7043.9	PY0F	28-Nov-1993	0358Z
7029.2	TI1C	28-Nov-1993	0356Z
7031.8	ZF2WW	28-Nov-1993	0355Z
7054.3	FS4PL	28-Nov-1993	0356Z
7033.0	VP9AD	28-Nov-1993	0355Z
7019.6	LZ9A	28-Nov-1993	0355Z
7035.5	VP5P	28-Nov-1993	0354Z
7015.7	EL2PP	28-Nov-1993	0356Z
7059.4	EA2AR	28-Nov-1993	0353Z
7036.0	VP5P	28-Nov-1993	0311Z
7002.7	HZ1AB	28-Nov-1993	0323Z
7001.0	7Q7LA	28-Nov-1993	0322Z
7020.6	HK1R	28-Nov-1993	0321Z
7036.7	VP5P	28-Nov-1993	0257Z
7031.1	4U1ITU	28-Nov-1993	0221Z
7033.8	CO2MA	27-Nov-1993	1324Z
7004.8	VK3APN	27-Nov-1993	1320Z
7016.2	CO2HR	27-Nov-1993	1319Z
7032.0	FG5BG	27-Nov-1993	1318Z
7033.8	3D2SG	27-Nov-1993	1317Z
7005.2	VK3APN	27-Nov-1993	1231Z

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7028.6	ES5RY	27-Nov-1993	1227Z
7035.1	WD5N/HC8	27-Nov-1993	1207Z
7035.2	KH4/N7TNL	27-Nov-1993	1142Z
7029.6	AH0K	27-Nov-1993	1140Z
7024.6	P29DK	27-Nov-1993	1138Z
7011.5	CU2A	27-Nov-1993	1036Z
7041.4	C82MA	27-Nov-1993	0952Z
7026.9	KH4/N7TNL	27-Nov-1993	1030Z
7042.9	V31KF	27-Nov-1993	0951Z
7003.9	VS6WO	27-Nov-1993	1032Z
7030.5	R6L	27-Nov-1993	1021Z
7026.1	LX4B	27-Nov-1993	1021Z
7030.8	9Y4H	27-Nov-1993	0926Z
7009.4	FY0EK	27-Nov-1993	0916Z
7009.4	FY0IK	27-Nov-1993	0911Z
7028.6	OH6YF	27-Nov-1993	0909Z
7024.3	LY7A	27-Nov-1993	0907Z
7019.4	P40J	27-Nov-1993	0906Z
7043.2	V31KF	27-Nov-1993	0855Z
7014.8	KL7RA	27-Nov-1993	1006Z
7010.0	J6DX	27-Nov-1993	1009Z
7000.4	CX9AU	27-Nov-1993	0858Z
7007.0	3D2HI	27-Nov-1993	1008Z
7007.4	EI4HM	27-Nov-1993	0935Z
7016.4	J6DX	27-Nov-1993	0931Z
7005.2	UW2F	27-Nov-1993	0932Z
7003.3	ZF2WW	27-Nov-1993	0931Z
7001.3	UR8J	27-Nov-1993	0929Z
7003.1	CO2MA	27-Nov-1993	0921Z
7006.4	TI1C	27-Nov-1993	0921Z
7009.2	FY0EK	27-Nov-1993	0914Z
7013.4	FG5BG	27-Nov-1993	0913Z
7026.6	HD9N	27-Nov-1993	0914Z
7044.1	UA0JQ	27-Nov-1993	0907Z
7030.8	9Y4H	27-Nov-1993	0911Z
7038.5	C6A/N4RP	27-Nov-1993	0905Z
7007.1	EI4HM	27-Nov-1993	0907Z
7039.4	P40N	27-Nov-1993	0851Z
7006.2	FY0EK	27-Nov-1993	0848Z
7005.0	CP6UH	27-Nov-1993	0844Z
7001.4	IS0OM	27-Nov-1993	0830Z
7032.5	JW8XM	27-Nov-1993	0832Z
7040.8	LY2JB	27-Nov-1993	0819Z
7031.2	RU1A	27-Nov-1993	0823Z
7030.6	S50S	27-Nov-1993	0821Z
7000.7	ZL7FD	27-Nov-1993	0815Z
7034.8	YS1X	27-Nov-1993	0816Z
7028.0	ES5RY	27-Nov-1993	0812Z
7005.3	GU3HFN	27-Nov-1993	0759Z
7029.9	HH2PK	27-Nov-1993	0725Z
7031.4	P40N	27-Nov-1993	0727Z
7040.0	6V6U	27-Nov-1993	0709Z
7046.3	HB9CEY	27-Nov-1993	0712Z
7048.5	RC2AZ	27-Nov-1993	0712Z
7054.7	UC2IO	27-Nov-1993	0711Z
7029.0	9A1A	27-Nov-1993	0558Z
7054.0	4K2MAL	27-Nov-1993	0544Z
7013.8	LZ9A	27-Nov-1993	0533Z
7031.2	KL7MA	27-Nov-1993	0532Z
7037.8	S59KAB	27-Nov-1993	0505Z
7057.0	LZ1ZX	27-Nov-1993	0503Z
7030.6	A22MN	27-Nov-1993	0503Z
7029.7	4M5I	27-Nov-1993	0459Z
7001.9	EA8NQ	27-Nov-1993	0501Z
7012.9	JY8VJ	27-Nov-1993	0447Z
7004.4	TU2MA	27-Nov-1993	0456Z
7036.7	VP5P	27-Nov-1993	0257Z
7001.0	TA2BD	27-Nov-1993	0249Z
7031.1	4U1ITU	27-Nov-1003	0221Z
7020.6	HK1R	27-Nov-1993	0220Z
7015.9	8R1K	27-Nov-1993	0152Z
7027.0	J6DX	27-Nov-1993	0147Z
7023.6	CR4W	27-Nov-1993	0022Z
7022.2	4X/S59PR	27-Nov-1993	0039Z
7052.0	7Q7OO	27-Nov-1993	0039Z
7030.7	A22MN	27-Nov-1993	0028Z
7018.4	FY0EK	27-Nov-1993	0031Z
7017.9	EL2PP	27-Nov-1993	0028Z

LOW BAND MONITOR POWER SPOTS - DECEMBER 1993

TNX: N8HTT - W8TN - KD7SO - W1WAI - AB0X - NI6T - K9FD - K0II - N5WA - K3ND - WA0PUJ - WA0GFS

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1832.6	A71CW	30-Dec-1993	0150Z
1835.0	XF4CI	29-Dec-1993	0254Z
1831.5	PA0HIP	29-Dec-1993	0229Z
1833.0	HA4EHQ	27-Dec-1993	2311Z
1833.0	LA5FHA	27-Dec-1993	2245Z
1831.0	OH2BCI	27-Dec-1993	2226Z
1824.0	AB6DH/KH2	27-Dec-1993	1445Z
1838.0	RB4LX	27-Dec-1993	0526Z
1833.0	EV0A	27-Dec-1993	0519Z
1832.0	ZS6EZ	27-Dec-1993	0312Z
1831.0	A71CW	26-Dec-1993	0048Z
1908.8	JA1CGM	25-Dec-1993	1321Z
1831.9	UC2WAF	25-Dec-1993	0534Z
1829.5	OM3TZW	24-Dec-1993	0404Z
1831.3	FG5BG	24-Dec-1993	0309Z
1830.6	ZS5LB	24-Dec-1993	0257Z
1833.2	J37ZY	24-Dec-1993	0241Z
1843.0	YS1JRG	24-Dec-1993	0245Z
1834.4	HP2CWB	24-Dec-1993	0233Z
1908.4	JA6HUG	23-Dec-1993	1307Z
1838.0	HK0HEU	23-Dec-1993	0446Z
1832.0	OM3TZQ	23-Dec-1993	0017Z
1829.0	SM3LZG	22-Dec-1993	2302Z
1832.1	ZS6EZ	22-Dec-1993	2201Z
1828.1	YU7AU	22-Dec-1993	2152Z
1908.8	JA1CGM	22-Dec-1993	1158Z
1832.3	KP2J	22-Dec-1993	1049Z
1837.5	OZ4IP	21-Dec-1993	1409Z
1827.7	SM4CAN	21-Dec-1993	0515Z
1830.6	G3PQA	21-Dec-1993	0501Z
1831.2	RA0FA	20-Dec-1993	1323Z
1837.7	FK8CP	20-Dec-1993	0915Z
1833.5	PA0XPQ	20-Dec-1993	0702Z
1836.6	HB9NL	20-Dec-1993	0647Z
1833.5	OZ8ABE	20-Dec-1993	0643Z
1830.6	DK6NP	20-Dec-1993	0626Z
1835.7	6W6JX	20-Dec-1993	0618Z
1833.5	OZ8ABE	20-Dec-1993	0614Z
1834.6	OE6IMD	20-Dec-1993	0612Z
1823.8	OK1ANO	20-Dec-1993	0545Z
1834.5	UC2LB	20-Dec-1993	0549Z
1827.4	OM3TQX	20-Dec-1993	0550Z
1833.5	OZ8ABE	20-Dec-1993	0548Z
1837.1	SV8ZS	20-Dec-1993	0547Z
1845.2	UB5ZND	20-Dec-1993	0537Z
1836.0	4K1F	20-Dec-1993	0522Z
1834.2	OE6IMD	20-Dec-1993	0518Z
1835.4	RB5CU	20-Dec-1993	0523Z
1840.5	OZ3SK	20-Dec-1993	0510Z
1837.1	UW3PZ	20-Dec-1993	0509Z
1837.0	TL8NG	20-Dec-1993	0500Z
1835.9	4K1F	20-Dec-1993	0438Z
1833.2	SP8FHM	20-Dec-1993	0416Z
1845.0	A92BE	20-Dec-1993	0302Z
1838.7	SP3IOE	20-Dec-1993	0318Z
1828.4	OK1DOT	20-Dec-1993	0304Z
1831.5	TL8NG	20-Dec-1993	0209Z
1825.2	H44/DK7PE	19-Dec-1993	1309Z
1826.0	S58MM	19-Dec-1993	0626Z
1824.0	OE6IMD	19-Dec-1993	0625Z
1833.5	HA8BE	19-Dec-1993	0552Z
1832.0	OM3TQX	19-Dec-1993	0549Z
1826.6	UC2SD	19-Dec-1993	0453Z
1842.0	YO5QAW	19-Dec-1993	0442Z
1835.0	UA2FF	19-Dec-1993	0424Z
1833.7	UC2LB	19-Dec-1993	0423Z
1835.2	UA2FF	19-Dec-1993	0233Z
1838.0	9K2MU	19-Dec-1993	0028Z
1827.0	H44/DK7PE	18-Dec-1993	1212Z
1836.0	ZL4WA	18-Dec-1993	1154Z
1837.2	UO5GR	18-Dec-1993	0449Z
1830.4	SV8ZS	18-Dec-1993	0431Z
1838.0	T93M	18-Dec-1993	0219Z
1838.2	TA2BK	18-Dec-1993	0019Z
1830.3	ZS5LB	17-Dec-1993	0249Z
1845.0	A92BE	16-Dec-1993	2348Z
1832.3	A71CW	16-Dec-1993	2254Z
1838.3	RB5CU	14-Dec-1993	0457Z

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3506.1	3B8CF	30-Dec-1993	1500Z
3795.7	RM93MR	30-Dec-1993	1354Z
3796.0	UM1N	30-Dec-1993	1249Z
3509.8	LY1DF	30-Dec-1993	0505Z
3799.5	XQ8ABF	30-Dec-1993	0223Z
3509.8	FY5GA	30-Dec-1993	0211Z
3509.9	HK0ER	30-Dec-1993	0201Z
3789.0	9V1XQ	29-Dec-1993	2238Z
3799.0	A92BE	29-Dec-1993	2304Z
3800.0	5N0MVE	29-Dec-1993	2022Z
3795.0	JW0G	29-Dec-1993	2000Z
3506.8	ZK2XJ	29-Dec-1993	1513Z
3795.0	T77J	29-Dec-1993	1510Z
3772.0	OY1A	29-Dec-1993	1508Z
3506.2	UZ2FWA	29-Dec-1993	1433Z
3794.0	RW9FW(17)	29-Dec-1993	1442Z
3506.0	3B8CF	29-Dec-1993	1427Z
3777.0	UN7VV	29-Dec-1993	1433Z
3789.1	A45ZZ	29-Dec-1993	1420Z
3790.0	T32BB	29-Dec-1993	1414Z
3797.0	XF4CI	29-Dec-1993	1242Z
3792.0	TF3BM	29-Dec-1993	1038Z
3788.0	F6CTT	29-Dec-1993	0828Z
3504.0	GW3YDX	29-Dec-1993	0826Z
3793.0	C53HG	29-Dec-1993	0718Z
3509.0	T94US	29-Dec-1993	0506Z
3510.0	4K1F	29-Dec-1993	0441Z
3799.9	FS4PL	29-Dec-1993	0434Z
3517.5	CH2BQB(2)	29-Dec-1993	0348Z
3784.6	4L0G	29-Dec-1993	0320Z
3794.3	OY1HJ	29-Dec-1993	0215Z
3794.0	LA7SL	29-Dec-1993	0213Z
3791.0	HC4CZE	22-Dec-1993	1112Z
3512.2	OK1FKM	22-Dec-1993	0239Z
3505.6	3B8CF	22-Dec-1993	0204Z
3799.0	A71CW	22-Dec-1993	0133Z
3506.0	JT1BV	21-Dec-1993	1325Z
3797.4	HL1LLF	20-Dec-1993	1208Z
3508.0	OA4CWR	20-Dec-1993	1038Z
3792.0	J69MV	20-Dec-1993	1012Z
3796.5	OY9JD	20-Dec-1993	0947Z
3785.0	GU2FRO	20-Dec-1993	0757Z
3794.0	GD4PTV	20-Dec-1993	0746Z
3795.2	7X2LS	20-Dec-1993	0517Z
3509.3	HA0NAR	20-Dec-1993	0504Z
3791.9	UC1AWZ	20-Dec-1993	0445Z
3500.9	Z21HS	20-Dec-1993	0435Z
3792.0	UC1AWZ	20-Dec-1993	0409Z
3798.4	ZS1RL	20-Dec-1993	0359Z
3798.3	A92BE	20-Dec-1993	0313Z
3790.0	3A2LU	20-Dec-1993	0307Z
3504.3	TI2PZ	20-Dec-1993	0258Z
3506.0	LZ1KOZ	20-Dec-1993	0251Z
3508.6	RC2SA	19-Dec-1993	2228Z
3511.5	UC2LBF	19-Dec-1993	2232Z
3506.0	UA0FM	19-Dec-1993	1349Z
3795.4	OH1XX	19-Dec-1993	1258Z
3508.0	VS6WV	19-Dec-1993	0939Z
3800.0	V63JC	19-Dec-1993	0918Z
3504.3	PZ1DY	19-Dec-1993	0849Z
3504.5	LX2PA	19-Dec-1993	0536Z
3791.0	Z31PK	19-Dec-1993	0502Z
3516.0	RC2CO	19-Dec-1993	0439Z
3511.0	4O7AV	19-Dec-1993	0434Z
3501.0	T91ENS	19-Dec-1993	0428Z
3500.8	1B/KU0J	19-Dec-1993	0355Z
3500.4	T94JW	19-Dec-1993	0300Z
3795.4	ZP5MGR	19-Dec-1993	0054Z
3514.3	5Z4JD?	19-Dec-1993	0031Z
3510.5	7X4AN	18-Dec-1993	2244Z
3503.5	P29DK	18-Dec-1993	1344Z
3505.2	VK9NS	18-Dec-1993	0953Z
3502.0	YL1WW	18-Dec-1993	0658Z
3770.6	HP8ADU	18-Dec-1993	0609Z
3799.8	Z31PK	18-Dec-1993	0604Z
3774.0	T93M	18-Dec-1993	0512Z
3506.0	3DA0BK	18-Dec-1993	0255Z
3506.3	1B/KU0J	18-Dec-1993	0236Z

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7003.1	VU2OXX	30-Dec-1993	1947Z
7001.5	Z37DRS	30-Dec-1993	1926Z
7006.5	4K4/UZ0QXY	30-Dec-1993	1604Z
7004.6	GW3YDX	30-Dec-1993	1545Z
7005.7	ON4ACG	30-Dec-1993	1542Z
7005.0	HL1AVS	30-Dec-1993	1516Z
7009.1	VQ9SS	30-Dec-1993	1454Z
7002.1	VU2TS	30-Dec-1993	1453Z
7004.4	9V1YC	30-Dec-1993	1352Z
7005.8	ES1WN	30-Dec-1993	1348Z
7007.0	ZK2XJ	30-Dec-1993	1311Z
7060.6	JTIBV	30-Dec-1993	1155Z
7003.3	1B/KU0J	30-Dec-1993	0316Z
7004.8	4Z5BZ	30-Dec-1993	0311Z
7003.0	ZA1J	30-Dec-1993	0132Z
7045.0	A92BE	30-Dec-1993	0119Z
7012.1	Z32JA	30-Dec-1993	0003Z
7007.0	OM3YL	29-Dec-1993	2331Z
7002.2	7X4AN	29-Dec-1993	2330Z
7009.2	CX8BR	29-Dec-1993	2219Z
7022.0	BV2OO	29-Dec-1993	1639Z
7005.5	BV4CT	29-Dec-1993	1619Z
7003.3	BY1TQH	29-Dec-1993	1551Z
7001.5	YJ0AXX	29-Dec-1993	1539Z
7009.2	UC2WEL	29-Dec-1993	1504Z
7001.9	T94US	29-Dec-1993	1455Z
7003.8	YJ0AF	29-Dec-1993	1433Z
7010.6	UB5ZBG	29-Dec-1993	1420Z
7004.0	FR5BT	25-Dec-1993	1440Z
7017.0	A45ZZ	23-Dec-1993	1323Z
7009.1	YJ0AFU	22-Dec-1993	1124Z
7179.0	XF4CI	22-Dec-1993	0703Z
7055.0	5T5JC	22-Dec-1993	0709Z
7011.8	4K1F	22-Dec-1993	0643Z
7183.0	XF4CI	22-Dec-1993	0636Z
7004.5	3D2MQ	22-Dec-1993	0624Z
7000.2	TI2KWN	22-Dec-1993	0619Z
7006.0	HR1B/TG9	22-Dec-1993	0550Z
7012.5	C53HG	21-Dec-1993	2259Z
7003.0	9H1EL	21-Dec-1993	2225Z
7001.0	T9/PA3DZN	21-Dec-1993	2221Z
7008.4	YB0ARF	21-Dec-1993	2125Z
7007.0	N7ET/DU7	21-Dec-1993	1414Z
7002.0	VQ9TV	21-Dec-1993	1125Z
7184.0	5T5JC	20-Dec-1993	0726Z
7001.0	S51GW	20-Dec-1993	0729Z
7004.0	UC1AWZ	20-Dec-1993	0720Z
7005.0	7X4AN	19-Dec-1993	2328Z
7005.9	8R1J	19-Dec-1993	2247Z
7009.0	6W6JX	19-Dec-1993	2237Z
7001.0	9H1EL	19-Dec-1993	2227Z
7006.2	H44/DK7PE	19-Dec-1993	1430Z
7004.1	HZ1AB	19-Dec-1993	1334Z
7017.3	YJ0AFU	19-Dec-1993	1313Z
7184.0	ZK1AT	19-Dec-1993	0734Z
7184.0	V63JC	19-Dec-1993	0734Z
7025.3	Z21HS	19-Dec-1993	0438Z
7010.0	FY5GJ	19-Dec-1993	0302Z
7007.6	5B4OG	19-Dec-1993	0237Z
7004.0	4K2OX	19-Dec-1993	0134Z
7000.8	ZD8VJ	19-Dec-1993	0129Z
7005.9	YN/SM0OIG	19-Dec-1993	0054Z
7003.0	SU2MT	18-Dec-1993	1444Z
7008.0	UI8AA	18-Dec-1993	1343Z
7019.0	V73C	18-Dec-1993	1058Z
7021.0	BV4ME/2	17-Dec-1993	1531Z
7005.4	SV2BOH	17-Dec-1993	0338Z
7008.5	7P8EZ	17-Dec-1993	0340Z
7003.5	3B8CF	17-Dec-1993	0258Z
7009.3	9H1EL	16-Dec-1993	2224Z
7002.2	YO2DFA	16-Dec-1993	1509Z
7008.7	FR5DN	16-Dec-1993	1442Z
7003.0	FK8GJ	16-Dec-1993	1435Z
7180.0	CY0SAB	16-Dec-1993	1127Z
7007.5	9J2BO	16-Dec-1993	0449Z
7000.8	1B/KU0J	16-Dec-1993	0333Z
7014.0	UB1KY/RB0W	16-Dec-1993	0305Z
7007.9	PZ1DY	16-Dec-1993	0232Z